UNIVERSAL MODEL AIRPLANE NEWS

MAY 1933.

15¢ In Canada 20¢

THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO EXPERIMENTAL AVIATION"

THE WEDELL-WILLIAMS FINDS A "HOLE"

Maneuver Contest Picture No.

NEW

READY-BUILT

SILVER FLASH MODELS

SENSATIONAL

LOOK 'EM OVER—talk about class—actual unretouched photos of 3 NEW FLYING MODELS of the U. S. ARMY and NAVY'S latest FIGHTING and PURSUIT PLANES. FULLY CONSTRUCTED—COMPLETE IN DETAIL—9 cylinder Imm. radial engine, speed ring, shock absorbing landing gear, Pilot's cockpit, wing stars and tail stripe insigne, adjustable rudder and stabilizer for fast straight flights or circles. No waiting—no worry—fly them as soon as you receive them—just wind the propeller—let 'em go—watch them take off at high speed—soar thru the air for long distances—then glide in for a perfect 3-point landing.

Positively the biggest values ever offered in READY-BUILT PLANES. Order one or more now and enjoy some real sport.

U. S. Army Fighter

(P12)

One of the most efficient types of MILITARY AIRCRAFT used in the United States air service. Beautifully streamlined, trim and graceful, the model shown at left is a dandy performer, takes off at high speed with a short run and glides in for a perfect 3-point landing.

COMPLETE—READY TO FLY

18-inch wing span

$2.50 Postpaid

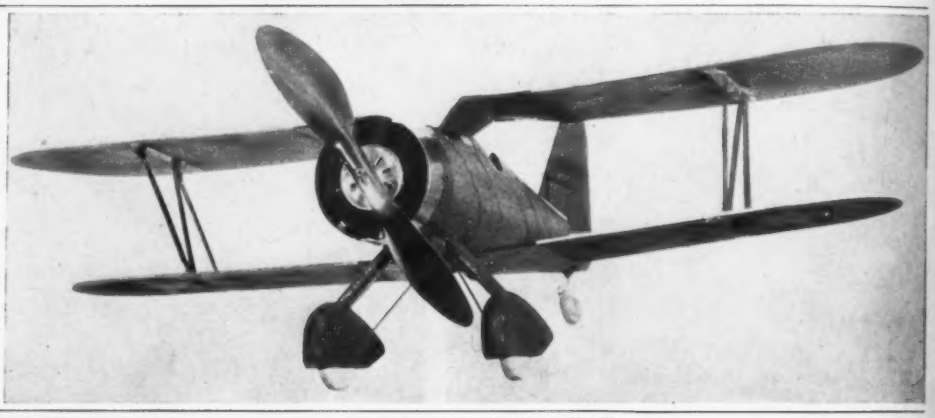
U. S. Navy Akron Fighter

(F9C2)

The newest and smallest of the NAVY'S AIR FIGHTING FLEET, carried inside the ill-fated giant dirigible, the U. S. S. AKRON. The model shown at right has all the characteristics of the large plane and is a fast, steady flier.

COMPLETE
READY TO FLY
18-inch wing span

$2.50 Postpaid



U. S. Army Pursuit

(P26)

A new type LOW WING MONOPLANE just added to Uncle Sam's Fighting Fleet, said to be the World's fastest pursuit plane, capable of doing over 225 miles per hour. The model shown at the left has excellent flying qualities, and is very realistic speeding thru the air.

FULLY CONSTRUCTED
AS SHOWN
18-inch wing span

$2.25 Postpaid

INSTRUCTIONS FOR ORDERING

Remit by check, registered cash or Postal Money Order. If insurance is desired, include 5c extra with your order. Stamps or foreign coin not accepted. No C.O.D. Canadian or Foreign, add 50 cents to above prices. Write your name and address plainly and send your order, together with remittance, to

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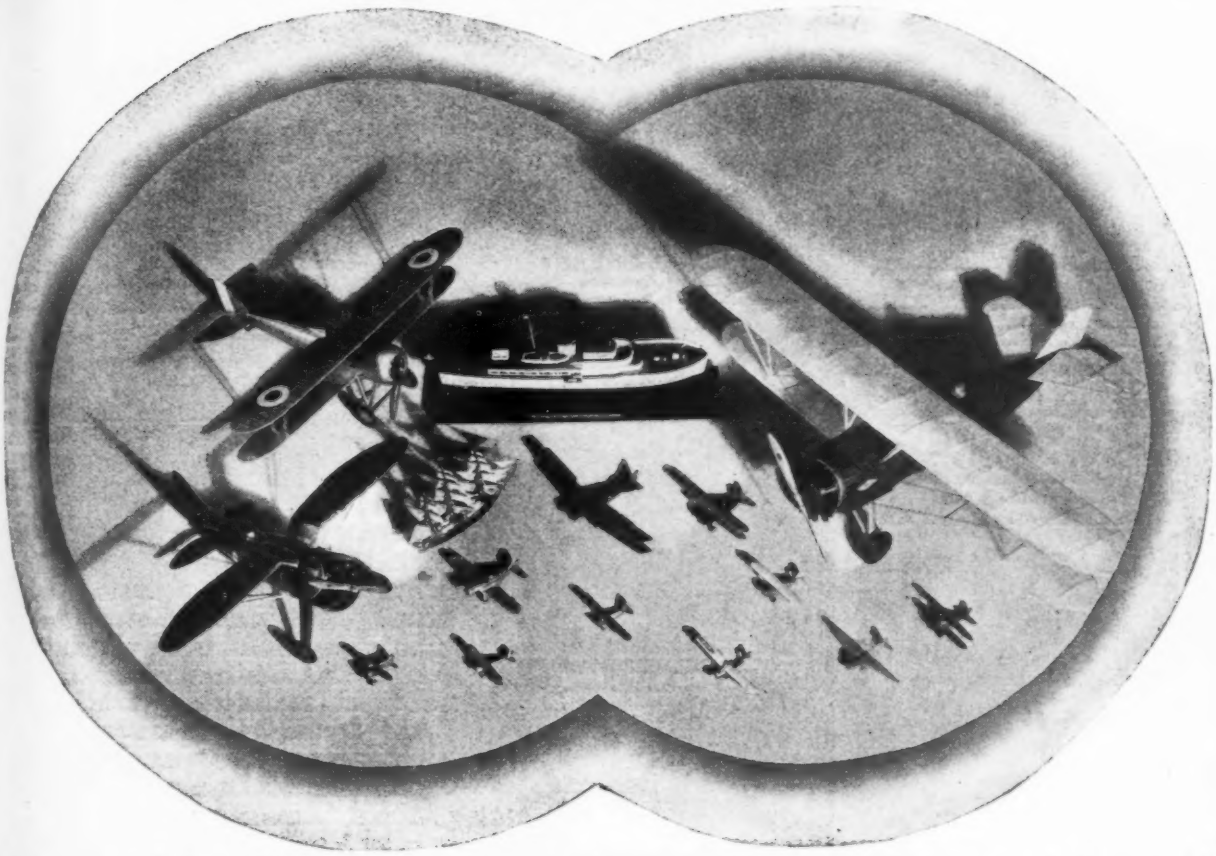

Come and Get 'Em! Kits now ready for 3 new Cleveland-Designed flyers—

HALL RACER! NIEUPORT 28! BOEING 95 MAIL!

and each with a ¾" scale pilot in the cockpit—another Cleveland-Designed feature, perfected after extensive experimentation. Now we will have a hard time convincing sceptics that "C-D" photos are of models!

The above picture, in addition to showing these three beautiful models, contains 13 other scale models of airplanes and boats. The full-size drawings of ALL *of these keen models are in* ISSUE NO. 3 OF CLEVELAND MODEL-MAKING NEWS AND PRACTICAL HOBBIES, *an engineering service publication. If you haven't yet subscribed—do so right away. See coupon.*

HALL RACER (lower left in above picture) also known as the "Springfield Bulldog," built at Granville Bros. (Gee-Bee) factory, was in the 1932 Thompson Trophy Races. Its striking gull-wing design is keenly duplicated in the authentic ¾" scale Cleveland-Designed model, just as are all its other important features. The model shown here has been touched up with China White for display purposes—this is not supplied with the Kit as many prefer just the plain red and black scalloped design. (China White is obtainable at most stationery stores.) Very pretty flights—fast and clean. Span is 19⅛"; length 14"; weight 2.8 oz. Kit N-6 (without drawing) at your dealers, or postfree, only **$1.40**

NIEUPORT 28 (upper left in above picture) reported to be the first ship used by Americans to bring down an enemy plane in the world war, was flown by "Eddie" Rickenbacker, Quentin Roosevelt and other famous pilots. No model enthusiast should forego the thrill of building the authentic ¾" scale Cleveland-Designed model of this famous fighting craft. Its realism is startling—even to the veteran pilot seated at the controls. With its extremely thin wings and long fuselage, this little silver beauty flies quite well. Since in war time service this plane was used mostly by France, the Kit is furnished with French insignia. Span is 20¾"; length 16¼"; weight 2.8 oz. Complete Kit N-5 (without drawing) at your dealer's, or postfree, only **$1.40**

BOEING 95 Mail Plane (right side in above picture) is said by many to be the prettiest of all mail planes, and is used by a great many airlines throughout the U. S. This authentic ¾" scale Cleveland-Designed model is a "dead ringer" for it—even to the mail pilot—but designed slightly different from the customary Cleveland method, inasmuch as the fuselage is of ⅛" sq. longerons with 1/16 x 1/8" struts and short strut-bulkheads. Does not employ ailerons, though the builder may put them on. The model is surprisingly simple—in fact, we're recommending it for beginners if they feel the extremely simple FL models are too easy. An unusually large model, packed with looks, and a typical "mail must go through" flyer. Span is 33¼"; length 24¼"; weight 3.5 oz. Colored blue (special light dope). Kit N-7 (without drawing) at your dealer's, or postfree, only **$1.40**

BOAT LOVERS: Get Cleveland's sensational Boat List before building "Pastime", the 131-ft. High Speed Diesel cruiser above, or other C-D boats. Write for free complete circular.

Printed and Numbered Balsa in these Kits!

1932 Akron Fighter

Keen flyer. ¾" scale. Span 19⅛"; length 15⅛"; weight 2.2 oz. Colored silver and blue. Complete Kit SF-22, only **$1.95**

1932 Lockheed Vega

Extremely realistic. ¾" scale. Span 30¾"; length 21"; weight 3.7 oz. Colored red and gold. Complete Kit SF-24, only **$2.95**

Two Beauties You Sure Should Have!

1930 G. L. Sport Trainer

Very popular. ¾" scale. Span 20"; length 15¼"; weight 1.2 oz. Colored international orange and black. Complete Kit SF-1, only.. **$1.95**

1931 Supermarine S6-B

Great summer sport! Span 22"; length overall 21⅝"; weight 2.9 oz. Colored silver and blue. Complete Kit SF-19, only **$1.95**

New Low Prices have been put into effect not only on the great line of 50 Cleveland-Designed Kits, but on our big line of supplies and parts. Quality absolutely unchanged. Tell your friends. No longer need you risk disappointment, or dissatisfaction—be sure of quality by getting what you need from "Cleveland." Send at once for latest illustrated catalog—yours for the asking.

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( ) Copy of Issue No. 3 (with drawings of all models shown in large picture on this page) 25c

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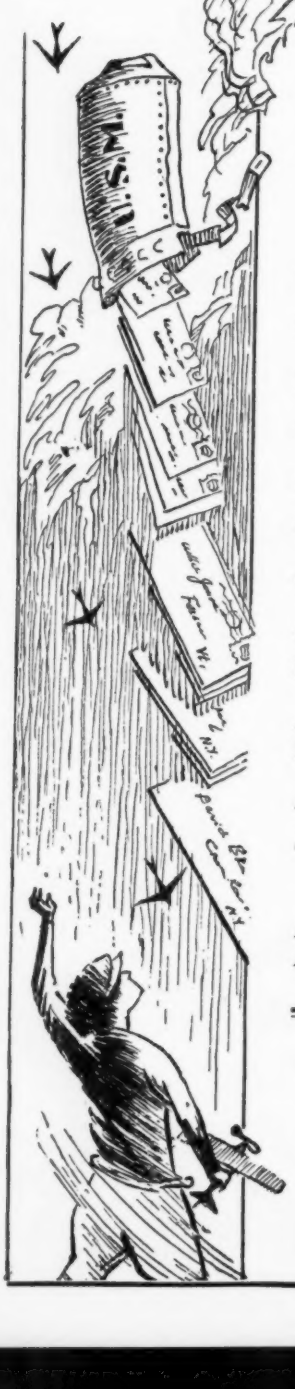
Model Airplane News

Vol. VIII *No. 5*



Edited by ***Charles Hampson Grant***

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In Our Next Issue

Prof. Alexander Klemin of the School of Aeronautical Engineering, N.Y.U., tells us some interesting facts about the problems of building trans-oceanic airplanes, in the third part of Reflections of an Airplane Designer. It is highly instructive and interesting.

Complete instructions and plans to build a remarkable flying scale model of the Stinson "R", by C. L. Bristol. This is one of the finest models you have ever seen.

Mr. Howard McEntee returns with more helpful "Whats" and "What Nots" of Model Plane Building.

The dramatic story of Capt. Swaab is concluded in part four of Fighting Wings, by Orville H. Kneen.

An All Weather Twin Pusher, by Stockton Ferris, Jr., tells you how you can create the contest model that won the 1931 Mulvihill Trophy in a 35-mile-per-hour gale.

Other interesting 3-view plans and articles by regular authors, also complete information about the Big National Contest. Do not miss this very interesting issue.

Order your copy of UNIVERSAL MODEL AIRPLANE NEWS from your newsdealer now, or send $1.65 for your year's subscription to this office, 125 West 45th Street, New York City. Canadian subscriptions, $2.00 per year, all other countries, $2.50.

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Spanish Galleon 6-In. Model

Mayflower 6-In. Model

Get Going on this New Idea!

Build These Miniature Ship Models

Here's your chance to try something entirely new. Beautiful, realistic replicas of Historic Ships, each one in a dandy Construction Kit. Now you can make these wonderful Models for only a few cents each. Boy! You'll get a thrill out of this new idea.

Santa Maria 6-In. Model

Half Moon 6-In. Model

Flying Cloud 6-In. Model

Constitution 6-In. Model

JUST look over these pictures at the left. They are real photographs of the Miniature Ship Models you can build with these fine Kits. Of course, the gorgeous coloring doesn't show here, but each Model is a wonderfully true reproduction of the original ship, and you can finish them in actual colors. Did you ever see anything finer for decorations, in your room or your den, on the radio, over the fireplace, or anywhere else? You can even sell them and earn some money!

Each Kit contains everything required to make one complete Model. You can carve the hull from a balsa block; use round wood for masts, bamboo for spars and yardarms, thread for rigging, and paper for sails; railings, deck fittings and other details are printed on sheet balsa. Cement the parts together with cement furnished in the Kit, then color and decorate your Model with materials also furnished. You get a full-size Plan to work from and detailed instructions for everything; you cannot go wrong—it's all explained for you! This is your chance for a new Model Sport. Look over these ships, select the ones you like the best and get going—there's real sport ahead for you.

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Another sensational Monthly Special Offer—ten 20½" x 24" sheets of genuine hand-made Hakone white tissue paper—for only 5c (worth 50c!) provided you buy at least $1 worth of B.P.A. supplies (kit orders not included) from this advertisement on or before midnight, July 31, 1933. This extra-quality tissue has wonderful tensile strength—makes your models last longer! Note each sheet is full-size: 20½" x 24".

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1/16" x 1/8", each	1c	.10 for	5c
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1/8" square, each	1c	.. 8 for	5c
3/32 x 3/16", each	1½c	.. 8 for	5c
1/8" x 3/16", each	1½c	.. 8 for	8c
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1/8 x 3/8", each	2c	.. 5 for	7c
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1 x 1", each	13c	.. 4 for	45c

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1/8" x 1/4", each	2c	....6 for 10c
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1/4" square, each	3c	....5 for 12c
1/8 x 3/8", each	2c	....5 for 9c

SHEET BALSA

	24"	36"
1/32 x 2"	3c	
1/16 x 2"	4c	5c
1/16 x 3"	6c	
1/16 x 4"	9c	
3/32 x 2"	4½c	6½c
1/8 x 2"	4½c	6½c
3/16 x 2"	6c	9c
1/4 x 2"		11c

PROPELLER BLOCKS

3/8 x ⅛ x 6", each	1c	....6 for 4c
1/2 x ⅜ x 6", each	1c	....6 for 5c
9/16 x ⅞ x 7", each	2c	....6 for 10c
3/4 x 1¼ x 8", each	3c	....3 for 8c
7/8 x 1¼ x 8", each	4c	....3 for 10c
3/4 x 1½ x 8", each	5c	....3 for 13c
3/4 x 1¾ x 10", each	6c	....3 for 15c
1 x 1½" x 8", each	7c	....3 for 18c
1 x 1¼ x 10", each	8c	....3 for 21c
1 x 1½ x 10", each	9c	....3 for 24c
1 x 1½ x 12", each	10c	....3 for 27c
1¼ x 1⅝ x 12", each	13c	....3 for 35c
2 x 2 x 12", each	17c	....3 for 48c

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2 x 3 x 36"	55c
2 x 6 x 36"	80c
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1/32 x 1/16" ..... 3 ft. for 1c
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1⅞" dia., per pair 16c

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3/32" dia., per ft.	8c
1/8" dia., per ft.	10c
3/16" dia., per ft.	11c
5/16" dia., per ft.	13c

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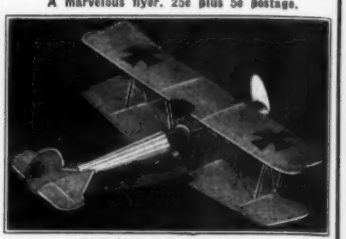

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2½" diam. 30c
3" diam. 35c
3½" diam. 45c
4" diam. 60c

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1¾" diam. 22c
2" diam. 25c
2½" diam. 28c
3" diam. 30c
3½" diam. 36c
4" diam. 40c

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.008 ..... sq. ft. 14c
.010 ..... sq. ft. 16c
.013 ..... sq. ft. 18c

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Enable you to use 2, 3 or 6 elastic motors in one plane. Complete, ready to attach to any plane.
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1" diam. .....pair 6c
1½" diam. .....pair 8c
1½" diam. .....pair 12c
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Streamliners, for wheels
For ¾" or 1" wh., pr. 15c
For 1¼" or 1⅝" wh., pr. 25c

DUMMY MOTORS, black only, 9-cyl. double impression
1½" diam. 15c
2" diam. 20c
3" diam. 27c

COWLINGS, black only
2½" diam. .....ea. 20c

Machine-Carved PROPELLERS
5" diam. Each .. **5c**

COVERING MATERIALS

Japanese Silk Tissue Paper
Grade A: Size 20½"x24½"
Colors: Red, white, blue, green, orange, olive brown.
2 sheets, 5c; 25c doz.
Grade B: Size 20"x30"
Colors: Red and green only.
3 sheets, 5c; 15c doz.
Black English Parachute
Size 20"x30". Color: Black only. 5c sheet; 6 sheets 25c

INSIGNIA

(Bull's eye) French or English: U. S. Stars; German Crosses, ¾" diam. 6 for 4c; 1¼" diam. 5 for 4c; 2" diam. 1c each; 3" diam. 2 for 5c.

Sheet No. 1: contains 24 insignia made up of French, English, German and American, 1½" diam. to ½" diam. Also rudder stripes. **10c EACH**

Sheet No. 2: contains four 3" diam. American stars, also complete rudder stripes 4½" long and the words: U. S. ARMY for wings and U. S. ARMY BOEING P-12B for fuselage. **10c EACH**

Washers for wheel hubs, etc. ⅛ O.D. or ¼ O.D. 2 doz. 3c

Very small washers, made especially for indoor models, dozen 3c.

Winders, smooth running, double geared. 25c each.

Waterproof Sandpaper, for polishing Balsa wood, 2c ea.

Bamboo (shredded) pieces 12" long, 1c.

Reed, 1/32", 3/64", 1/16" diam., 5 ft. 3c; 1/8" diam., 4 ft. 3c.

HEATH BABY BULLET

Complete kit for 7½" model. Will fly 100 feet if plans are followed... Enough material for 2 models, 20c p.p. **15c** p.p.

1/3 OFF! - - - WOBURN'S FAMOUS 15-Inch Flying Scale Models

Were 66c -- NOW **44¢** EACH POSTPAID

SOPWITH CAMEL; DH TIGER MOTH; GLOSTER SEAPLANE; FOKKER D-VIII; SUPERMARINE S6B; NIEUPORT BABY SCOUT; SUPERMARINE PURSUIT; P.Z.L. P.7; CURTISS HAWK PURSUIT; TRAVELAIR TEXACO 3; BELLANCA PURSUIT; PFALZ SON CITY 3; ANSALDO PURSUIT; STINSON DETROITER; LOCKHEED VEGA; LAIRD SUPER SOLUTION; LOCKHEED CHICAGO; SKYROCKET; ORION; CURTISS HELL DIVER; BOEING P-12-B; SOPWITH EXPERIMENTAL (S.E. 5).

All kits contain semi-finished prop, wood cut to size, colored dope, celluloid wheels, cement, dope tissue, bearings, etc. These kits are complete in every detail and the models make wonderful flights if built according to our plans and instructions.

15" HELL DIVER now 44c p.p. Complete Kit

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Special Propeller Carving Knives

The best obtainable for carving propellers, made from tempered steel, and take a keen edge. They have a point that makes it easy to get a hollow or cup-like shape in the blade of the propeller, thereby giving it a better pull or grip on the air. This increases efficiency, speed, distance and duration. Price each ..... **50c** p.p.

2-FT. STINSON DETROITER

This model has flown over 1000 feet. A winner for endurance and stability. Plans for 2-ft. Stinson Detroiter, 20c each; Plans for any 15-in. model, 10c each, 3 for 25c, 6 for 45c. **75c** p.p.

NEW "GLOISH" BALSA

24" STRIPS			
1/32x1/16	9 for	2c	
1/16x1/16	9 for	2c	
1/16x3/32	9 for	2c	
1/16x1/8	9 for	2c	
1/16x3/16	4 for	1c	
1/16x1/4	3 for	3c	
3/32x3/32	9 for	3c	
1/8x1/8	9 for	3c	
1/8x3/16	9 for	4c	
1/8x1/4	3 for	1c	
1/8x3/8	3 for	3c	
3/16x3/16	3 for	2c	
3/16x5/16	3 for	2c	
1/4x1/4	3 for	2c	
1/4x1/2	3 for	4c	

1/2x1/2	2 for	5c
1/2x3/4	2 for	7c
1/2x1	2 for	9c
1 x1	1 for	8c

24" SHEETS		
1/32x2	5 for	8c
1/20x2	5 for	8c
1/16x2	5 for	9c
3/32x2	5 for	11c
1/8 x2	4 for	12c
3/16x2	3 for	12c
1/4 x2	3 for	12c
5/16x2	2 for	13c
1/2 x2	1 for	9c

SPECIAL SIZE BALSA		
1/100x2x20	3 for	10c
1/64 x2x20	3 for	11c

24" PLANKS	
1x2	1 for 15c
1 1/2x3	1 for 18c
2x2	1 for 20c
2x3	1 for 25c
2x4	1 for 35c
2x6x24"	50c
2x3x40"	45c
2x4x40"	60c

PROPELLER BLOCKS

3/8x3/4x5	3 for 2c
5/8x1x7	2 for 3c
5/8x9/8x8	1 for 3c
3/4x3/2x10	2 for 5c
5/4x3/2x12	1 for 4c
7/8x13/8x14	1 for 5c
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Tapered wood. Excellent for wings, etc. Tapers from 1/16 to 1/64 x 2 x 20", 2c each.

Block 2⅛ x 3¼ x 4¼" for nose piece of Hawker Fury, and planes calling for a solid block similar to this size, price each 15c.

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Made by nationally known manufacturers of Model Airplane Rubber. Tested by us and found to be superior to any on the market.

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50 ft., 7c; 100 ft., 13c
3/64 flat
50 ft., 9c; 100 ft., 17c
1/16 flat
50 ft., 12c; 100 ft., 23c
1/8 flat
50 ft., 13c; 100 ft., 25c
3/16 flat
50 ft., 19c; 100 ft., 37c

COLORLESS CEMENT
Small bottle 4c; 8 oz. 40c
Large 4" tube 8c

DOPE, ACETONE, OR BANANA OIL
Especially made for Model builders. (U.S.C.P.) United States Chemically Pure.
Small bottle 4c; 8 oz. 32c
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MUSIC SPRING WIRE
Strong and light. Polished to prevent rusting. Nos. 4, 5, 6, 8, 10, 12, 14, 16, and 18: 10 ft. @ 3c

Spare Parts Kit

1 sheet tissue	.05
20 strips 1/16x1/16x12	.10
10 strips 1/8x1/4x12	.10
100 strips bamboo..	.25
Colored dope	.05
2 prop. blocks	.03
Baby bullet plan .	.05
Total value	.63

Sent Postpaid **25c**

or Sent FREE with orders of $1.00 or over

FREE! Send for Free Plans of HEATH BABY BULLET and World's Lowest Prices on Model Supplies and Kits

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IMPORTANT ORDERING INSTRUCTIONS

10% packing and postage charge must accompany all orders. 10c extra to above charges on orders for less than 50c worth of balsa wood. No order under 75c accepted. No stamps or C.O.D.s. Orders west of the Mississippi 5c extra. Foreign orders 10c extra to above charges. Orders shipped same day received.

WOBURN

MODEL AIRPLANE SHOP

19 BELMONT ST., WOBURN, MASS. (Dept. U-5)

The Siemens-Halske D4 Pursuit

HERE is one of the trim craft that was produced towards the end of the war by the Germans, appearing on the Western Front in the Spring of 1918. It was powered with an eleven cylinder rotary, two hundred Halske air-cooled motor. To obtain greater efficiency the motor turned over only about 900 r.p.m., so a four-bladed propeller was used in order to insure sufficient thrust at this low speed.

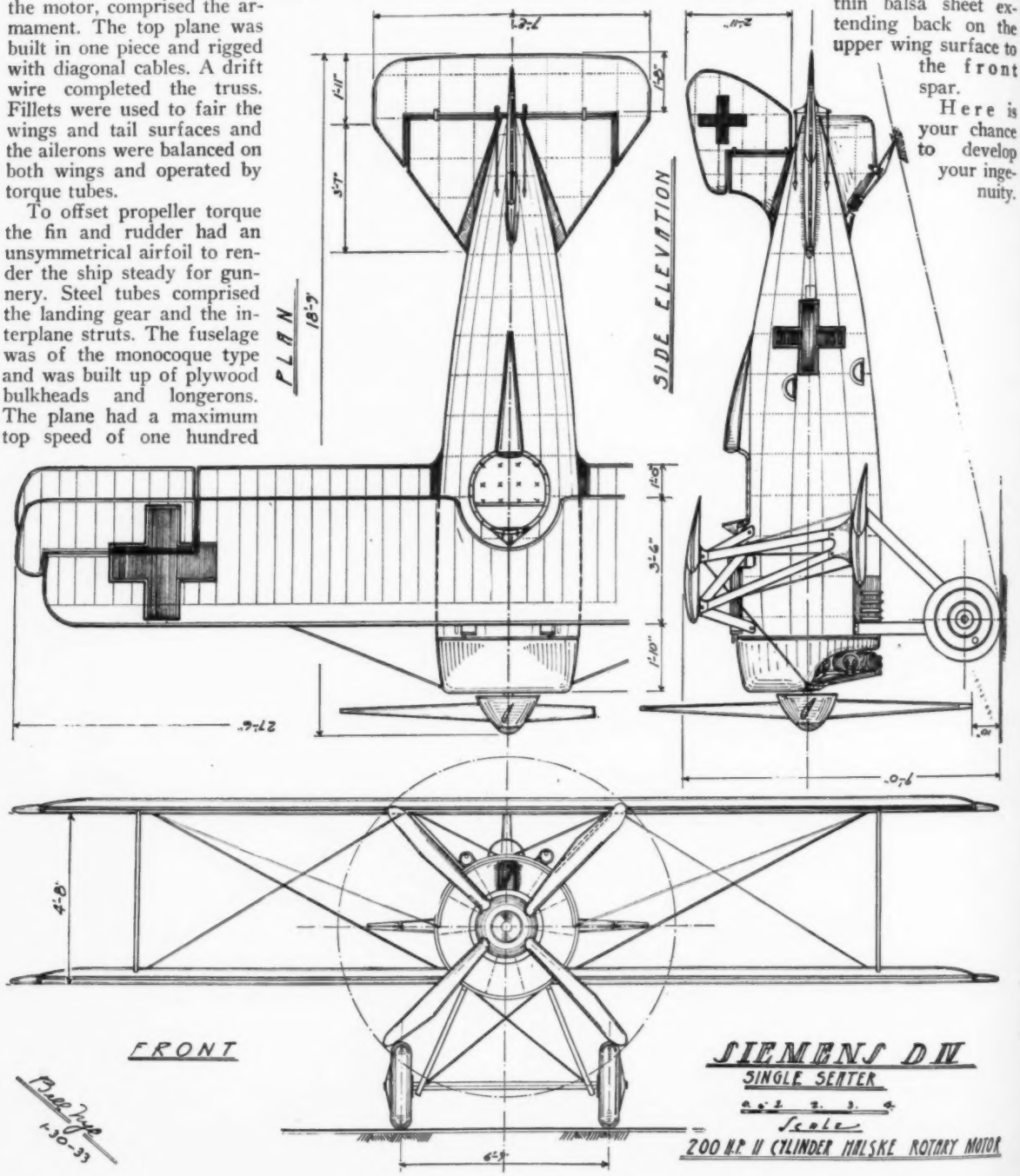
The tail surfaces were full cantilever and the wings were of fabric with plywood ribs spaced on six-inch centers. Two Parabellum machine-guns synchronized with the motor, comprised the armament. The top plane was built in one piece and rigged with diagonal cables. A drift wire completed the truss. Fillets were used to fair the wings and tail surfaces and the ailerons were balanced on both wings and operated by torque tubes.

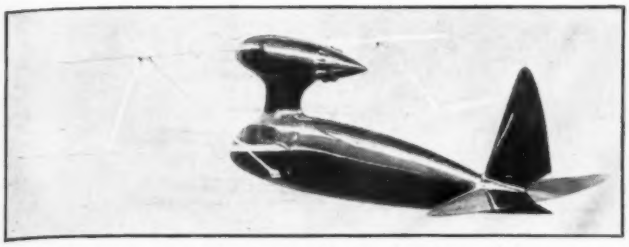
To offset propeller torque the fin and rudder had an unsymmetrical airfoil to render the ship steady for gunnery. Steel tubes comprised the landing gear and the interplane struts. The fuselage was of the monocoque type and was built up of plywood bulkheads and longerons. The plane had a maximum top speed of one hundred and thirty-five miles per hour. It employed a dural cowl over the rotary engine and a prop spinner. It was finished in black and silver.

A neat-looking detail scale model can be made from these plans. The body should be built up from strips of balsa running lengthwise, cemented to bulkheads. The tail surfaces should be veneer covered; the wings covered with paper or silk.

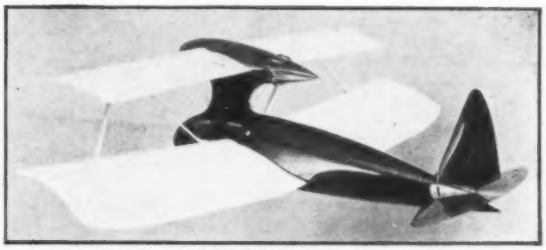
The framework of the wings should be built up, ribs mounted on two spars. Ribs may be spaced as indicated in the plans. The leading edge should be covered with a thin balsa sheet extending back on the upper wing surface to the front spar.

Here is your chance to develop your ingenuity.





A model with its variable area wings reduced to minimum area.



Here is the model with its wings extended to a maximum area.

New Wings for Our Airplanes

Some Interesting Facts About a New Invention That May Revolutionize Airplane Performance

By Fletcher Pratt

A cross section of the wing, showing the slot through which the auxiliary surface slides out to the wing tip.

A BOY watching a pigeon swoop down to the street before him for a morsel of bread and a young French soldier on leave from the Western Front, airing his Medaille Militaire before a shop-window where the proprietor was pulling down a curtain made of wooden splints—this is the combination out of which has grown the Gérin variable wing surface airplane. And the Gérin variable surface wing is the most startling innovation in airplane technique since de la Cierva brought the first autogiro down, to a beautiful landing, on a dime.

Here you see the auxiliary surface rolled up. Wing area in this case is at a minimum.

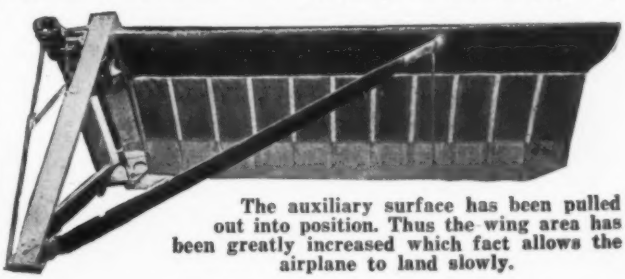
Not that the idea itself is new; inventors have been fooling with variable surface wings since Caudron tried to get the same effect with his old machine with the floppy trailing edges, in the prehistoric days before the World War. There have been all kinds of proposals for accomplishing it, from wings that pushed out from each other like a nest of boxes, to enormous parachutes which should drop an entire machine with very small wing surface gently onto the landing field. Most of them have never gotten beyond the wind tunnel stage. A few have been built, fewer still have been taken into the air to be brought down by swearing, angry test pilots, who declared they would never take such a crazy crate off the ground again.

But this time the invention seems destined to work. The French Air Ministry has experimented exhaustively on the new machine and has set its seal of approval on wing and inventor. Under its direction and with its approval, the first two Gérin machines are now being built in the Morane factory at Boulogne-sur-Seine, France; a biplane land machine and a biplane flying boat. As soon as these have passed their tests, work is to be begun on the first commercial Gérin, a giant transport boat, four-motored; a huge triplane that will have a performance in excess of that of the DO-X and will be perfectly capable of the hop across the Atlantic with passengers and mail.

That it does work is due to the boy who saw the pigeon. The boy was Jacques Gérin, and the incident took place years ago, when the Wrights and Santos-Dumont were making the first flights in France, and the imagination of every mechanically inclined French boy was turned in the direction of flying. Young Jacques Gérin noted how the pigeon spread the feathers of its wings to brake down its speed for the landing, and wondered how the same principle could be applied to an airplane. The wing of an airplane, he discovered, is never too big to give the proper braking on landing or to provide adequate flying surface at the moment of taking off, but it has a disgusting habit of being too big while in free flight, and thus braking down the speed of the machine when braking is not at all necessary.

Jacques Gérin, the inventor.

THERE the idea rested with him until the second incident. In the meantime he had become an aviator; the war was on, and he won his Medaille Militaire in a gallant and victorious *(Continued on page 40)*



The auxiliary surface has been pulled out into position. Thus the wing area has been greatly increased which fact allows the airplane to land slowly.

Helpful Hints for the Model Builder

By Alan Booton

IF you dread to prepare bamboo and avoid using it on account of miserable results, try the following hints and perhaps the results will win you over to the bamboo side.

Fig. No. 1 shows a typical split type bamboo landing gear with the parts lettered. Each strut has been selected and tested for its resiliency so it will have the correct spring when with the other parts. The idea is to select split bamboo that will just be rigid enough when assembled as a unit, to hold the weight of the model. This will insure longer life to the landing gear and especially the model.

In Fig. No. 1 the joint shows struts (b) cemented to the fuselage spacer at (a). Fig. No. 2 shows the result of this too rigid assembly during a hard landing. Struts (c) have buckled.

In Fig. No. 3 this trouble has been eliminated and Fig. No. 4 shows the result during a hard landing. While (a) is a rigid joint it is still free to move up and down during strains. The typical axle (e) in Fig. No. 1 is fitted against strut (c) and bends to hook around strut (d), eliminating loosening from landing shocks. The part (f) may be used instead of (a) in Fig. No. 8. On small light models, the struts (b) may be eliminated entirely.

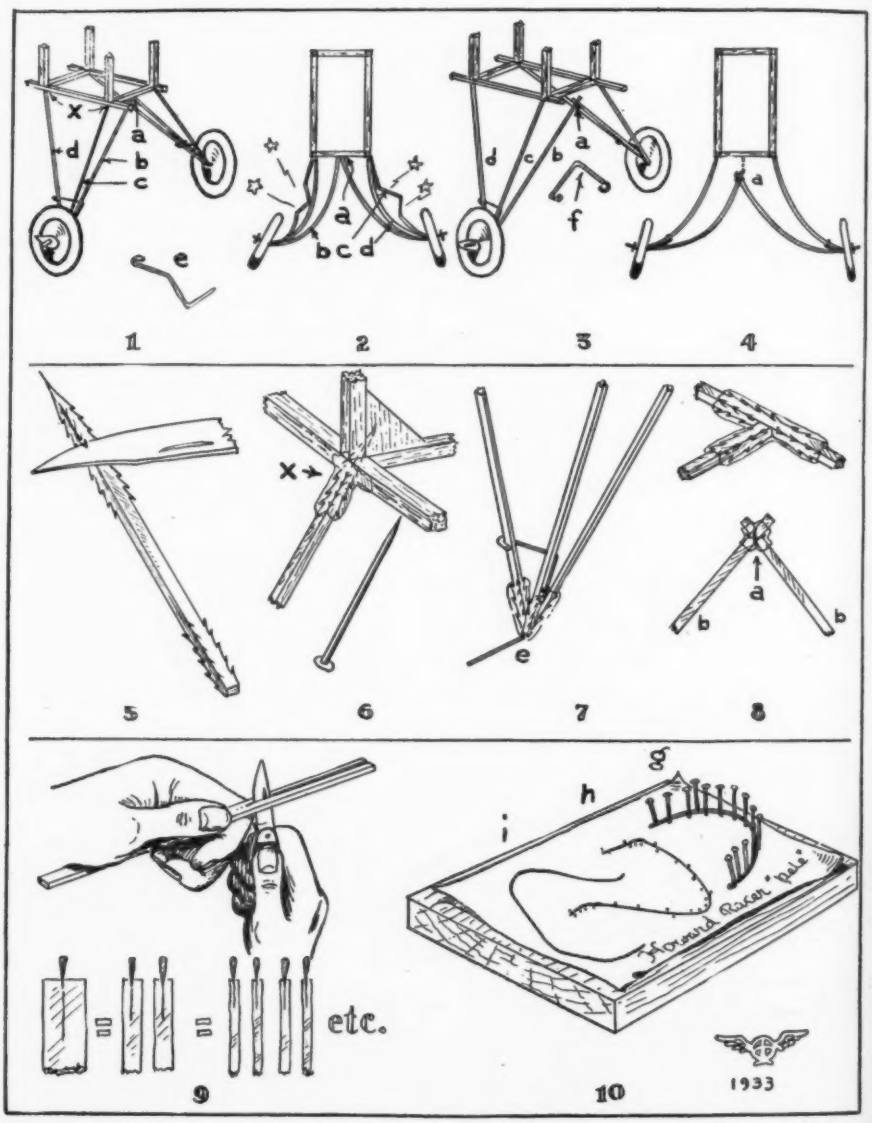
Fig. No. 5 shows the process of BURRING. A sharp knife is pressed against the corners of the bamboo at intervals and the result looks like a barbed spear and serves the same purpose, since bamboo pulls out of a cemented joint when smooth. This method can be applied to cabane and interplane struts as well as any other bamboo work.

Fig. No. 6 is a typical insertion of burred bamboo in a previously made pinhole in balsa. Only a small coating of cement is needed.

Fig. No. 7 is a typical strut junction with the axle in place. No binding is used. The top drawing in Fig. No. 8 is a butt joint used mostly in bamboo fuselage construction.

FOR those who have not learned the trick of splitting bamboo, Fig. No. 9 should hold some interest. The strip to be split is held as shown, knuckles together to prevent cutting the human element. Always start the split in the *middle* of the strip, otherwise the split will veer off to the side. A sharp knife is not essential because the thickness of the blade acts as a splitting wedge. Move slowly and observe the split as it travels down the strip. Should the split veer to the left, exert pressure to the right, and vice versa. When the resulting strips are about square, split the pith off. The pith is NOT used by advanced builders, but is neatly pitched into a waste basket. After the pith has been removed, the strips can be split at least once more if fine bamboo is desired.

A sure way to bend bamboo is shown in Fig. No. 10. For the wing tips and stabilizer-elevator, the bamboo is split wide enough to split into two parts after the baking. The rudder-fin is split to size at first. While boiling these for ten minutes, trace the patterns on paper, place them on a soft board and drive pins on the *inside* curves. Fit the hot bamboo around the pin jigs with a few pins and then place in a hot oven, until the paper turns to a very slight brownish tinge. Remove from the oven and cool thoroughly before removing the bamboo. Split the wing tips and stabilizer-elevator and the parts are true, fixed curves ready for assembly.



Fighting Wings

Capt. Swaab, America's Second Living Ace, Shows Himself to be an Intrepid Fighter in Breath-taking Encounters with the Enemy

By Orville H. Kneen
Author of "Flying for Everybody"

A Nieuport-Delage, Type 11. One of the most popular French pursuit planes of the war. It appeared on the front quite early in the struggle. (Courtesy of Joe Nieto.)

PART THREE

WHAT should I do? There hummed the German, diving for the tail of a member of my patrol. My comrade evidently had not seen the enemy. Once in position and the chances were more than even that my comrade in the clouds was lost. But . . . .!

Behind me swept *two* of the enemy. And if one of them got on *my* tail, I might appear next day in the casualty column.

Save yourself first! No better rule than that. Then perhaps the gods of war will give you a chance to do something for your comrade. Meantime, said common sense, forget the fellow in front, and *don't forget those guns in your rear.*

A lot quicker than it can be told, I had dived steeply, gaining speed, then snapped through a few sharp turns and landed in the rear of one of my opponents. A good place to be if you contemplate homicide rather than suicide.

A Friedrichshafen Pursuit, a much heard of but seldom seen German plane. Note the streamlines of the body.

I opened both guns at once. One burst after another. But nothing happened! I saw smoking tracer after tracer plough through the enemy machine. The pilot sailed on. He seemed to bear a charmed life.

Then—just as both guns jammed at the same instant—the enemy went down. He seemed completely out of control.

With two guns bad we usually called it a day. But this time I couldn't. I took up the chase, heading for my comrade and the enemy still trying to get into firing position on his tail.

Finally I overtook the German. What I could do without artillery I did not know. But the enemy saw me pull up in his rear. He could not stomach it. He gave up the fight and left without a shot.

Maybe I too, with both guns hopelessly jammed, was not happy to have the battle end! It goes to show what pure bluff will do—sometimes.

That night we counted up a good score. It was my fourth and fifth, only I failed to get confirmation for the last one, observers reporting that he appeared to land safely on his own territory, though badly crippled.

Tyndall had brought down a Rumpler. Clint Jones got a protecting Fokker and got into another fight at once, ending it by sending the second Fokker to a flaming death. La Force had shot a Fokker away from Clint's tail, saving my side-kick's life.

All told there were fifteen combats in that grand dog-fight. The result was nine clean-cut victories for our seven-man patrol—and not a single victory for the enemy!

WE talked over that fight for hours, and we were mighty glad of this chance to talk things over. We fought hard while we were at it, but we could return to clean, comfortable quarters and just naturally *leave* the war for a while. Between combats, airmen let each other strictly alone, as a general rule. It was much like the old-time jousting tournaments—man to man—fight it out—win or lose—then retire, if in condition to do so.

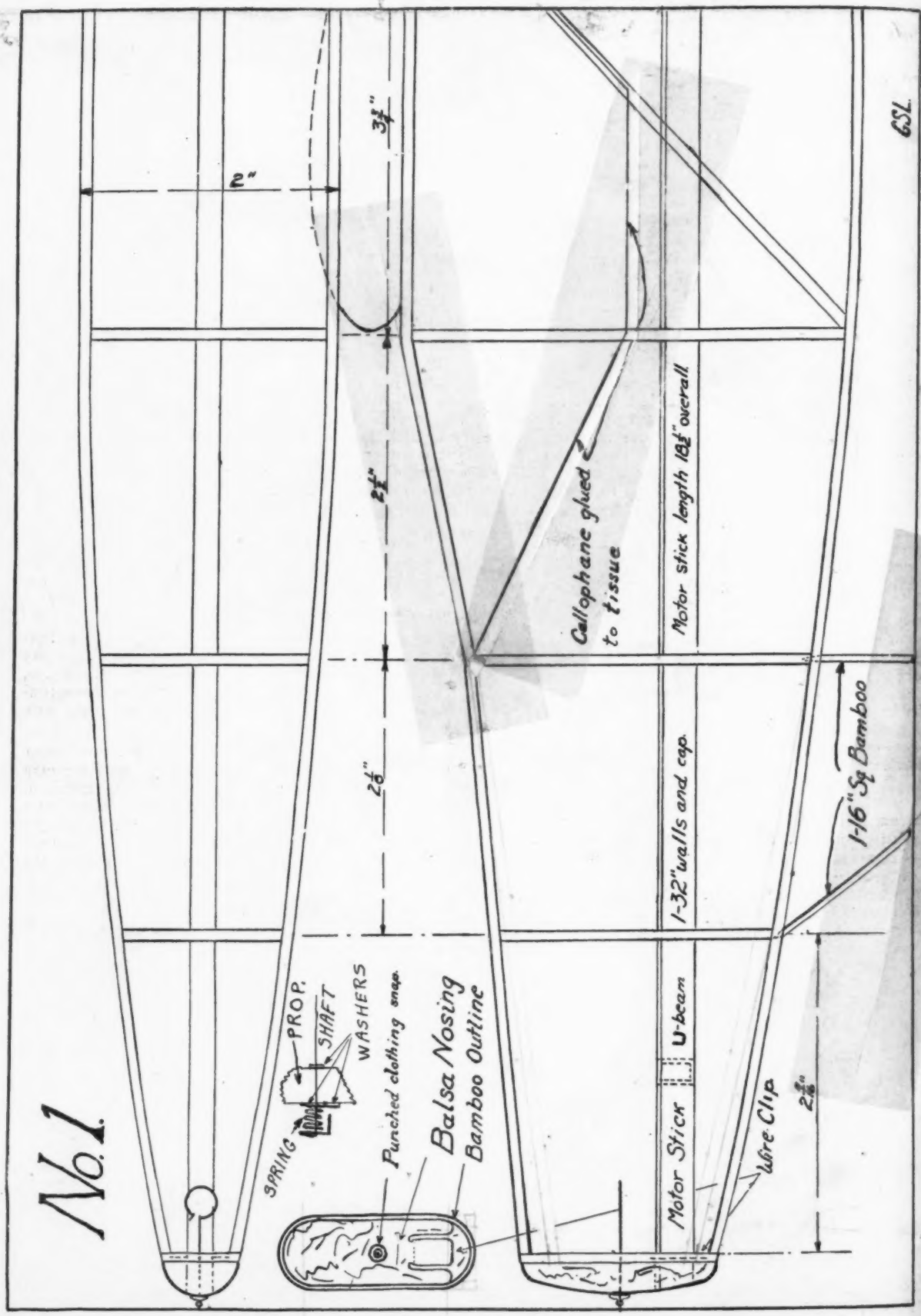
Pilots who got to the front all had the same idea on safety. Either a bullet would get you, or it wouldn't. So why worry? To save a comrade we took undue risks, did our fullest duty, but generally we did our best to live to fight another day.

Rain and hail kept us aground much of the time, outside of some bombing and strafing of troops. No one tried to stop me now. Every man was needed, for the French air forces had mostly been withdrawn from our sector. Often we went up to 13,000 feet or higher and in spite of fur-lined suits we got cold. Guarding against surprise attacks, I was always putting my head out and glancing backward. The clouds were thick and cold.

And—just to make things warmer—there were enemy Archies, flaming onions, or attacking aircraft, any or all of them ready to pop at any moment.

All the allied fronts were headed forward. American dough-boys were pouring in. We were keen to do our part. There was some talk of peace—but the Poilus, who were saying when *(Continued on page 38)*

A German Hannover CL5, Type No. 6, powered with 200-h.p. Mercedes or Opal Argus motor.


No. 1
2"
3½"
2½"
2½"
GSL
Cellophane glued to tissue
Motor stick length 18½" overall
1-32" walls and cap
U-beam
Motor Stick
1-16" Sq Bamboo
2½"
Wire Clip
PROP.
SHAFT
WASHERS
SPRING
Punched clothing snap
Balsa Nosing
Bamboo Outline

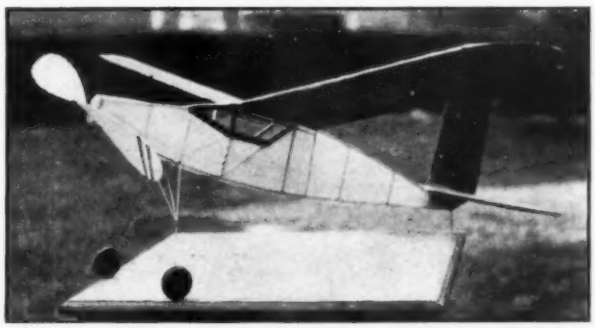
Build This World Record Fuselage Model

Here You Have Complete Instructions and Plans to Build a Plane of Sure-fire Performance that Established a World Record at the 1932 National Airplane Model Competition

By Gordon S. Light

FOR a model to be a good contest performer it must be capable not only of delivering good flights but must deliver them consistently. The contests of recent years have proved that the duration derived from unwinding rubber motors will not suffice. Therefore it is necessary to have a model that under satisfactory conditions will take advantage of every upward current and give a soaring performance.

It was the application of this idea that enabled me to design a type of model which frequently made flights of fourteen minutes. It was a plane of this type that won the Wakefield contest at Atlantic City with a flight of 25 minutes, 53 seconds in the eliminations, and an excellent flight in the finals when it was clocked at 7 minutes, 57 seconds as it disappeared in the sky high over the airport.



The record holder. It has flown for 51 min. 42 sec., reaching an altitude of 2000 feet.

The model is light in weight yet rugged in construction. The total weight is 1.8 ounces and the area 169 square inches. The loading per 100 square inches is 1.06 ounces. The large elevator and rudder aid greatly in insuring stability. The large propeller enables the model to gain sufficient altitude before the power is exhausted. The approximate area of the propeller is 25 square inches or 15 per cent of the wing area. Most models which are light and stable in the glide will soar indefinitely on a warm day if sufficient altitude is gained.

It was surprising to me how few contest models had the demountable motor stick. A demountable stick facilitates winding and removes all danger to the fuselage from breaking rubber; it also permits capacity winding. Using a short motor stick the center of gravity is brought forward and the stability is improved.

THE method of construction is conventional throughout and the model is delightfully simple to build. The plans I have prepared are full-sized and many dimensions are omitted but can be secured by using a rule. The necessary materials are:

1 balsa propeller block 1¾ x 1⅞ x 17.

12 pieces of 3/32 square balsa for wing, elevator, rudder, and fuselage.

1 balsa channel U-beam, ¼ x 3/16 outside dimensions, with 1/32 walls.

1 piece balsa 1/32 x 3/16 for cap for motor stick.

1 punched clothing snap, 10 washers, two feet of medium wire and one foot of heavy wire.

1 balsa nosing, 5/8 x 1¾ x ⅜.

Bamboo for landing gear and tail skid.

2 balsa wheels, 1½ in diameter x ⅜ thickness.

18 main wing ribs cut from 1/32 flat balsa, medium hard.

4 rudder ribs.

7 elevator ribs.

2 pieces balsa, 1/16 x 1/16 x 36 for bent wing tips.

1 piece 3/32 x ¼ x 36 for trailing edge of wing.

1 piece 1/16 x 5/32 x 36, trailing edge of rudder and elevator.

3 sheets Japanese tissue, and a small amount of cellophane.

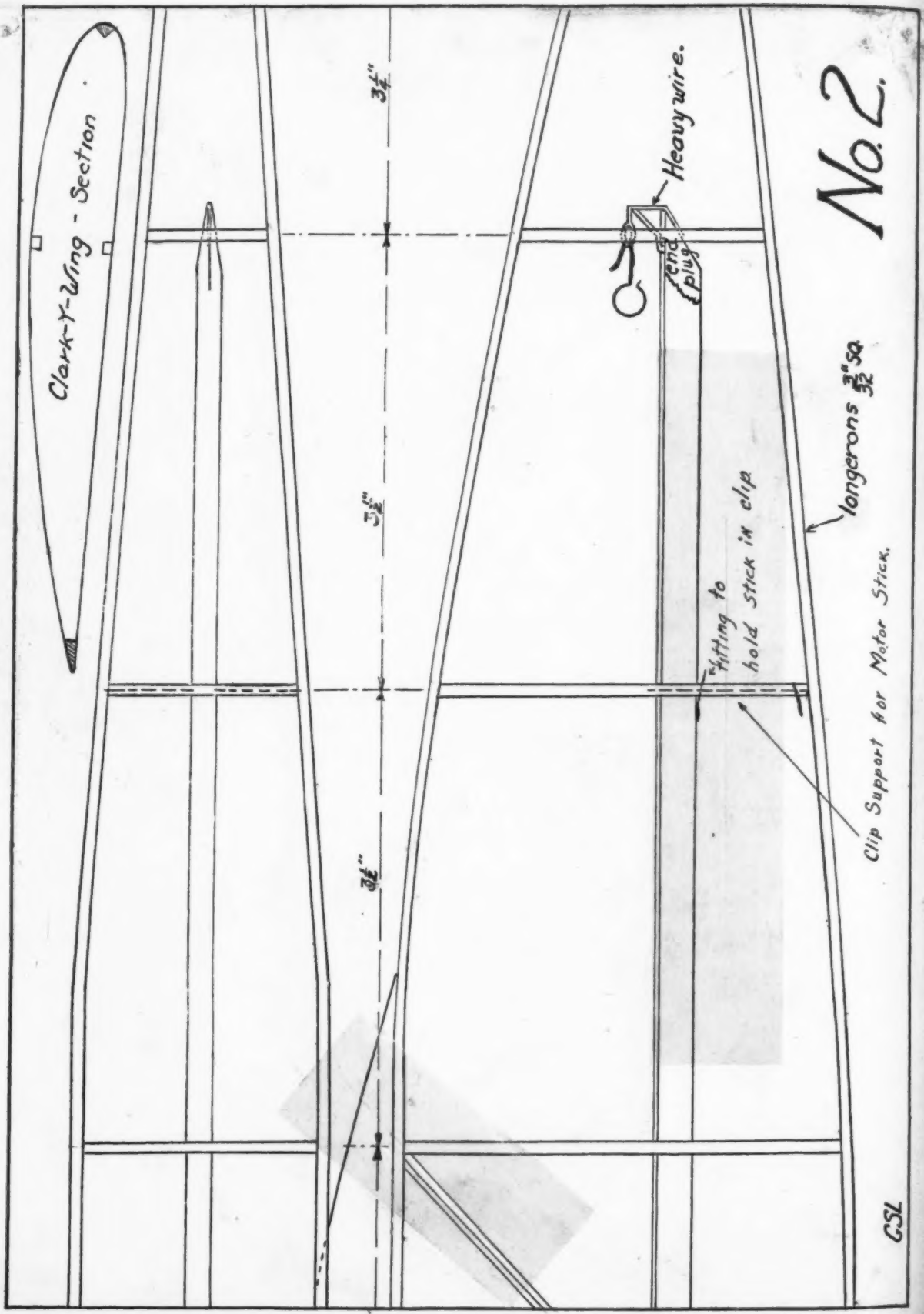
Banana oil, dope and ambroid.

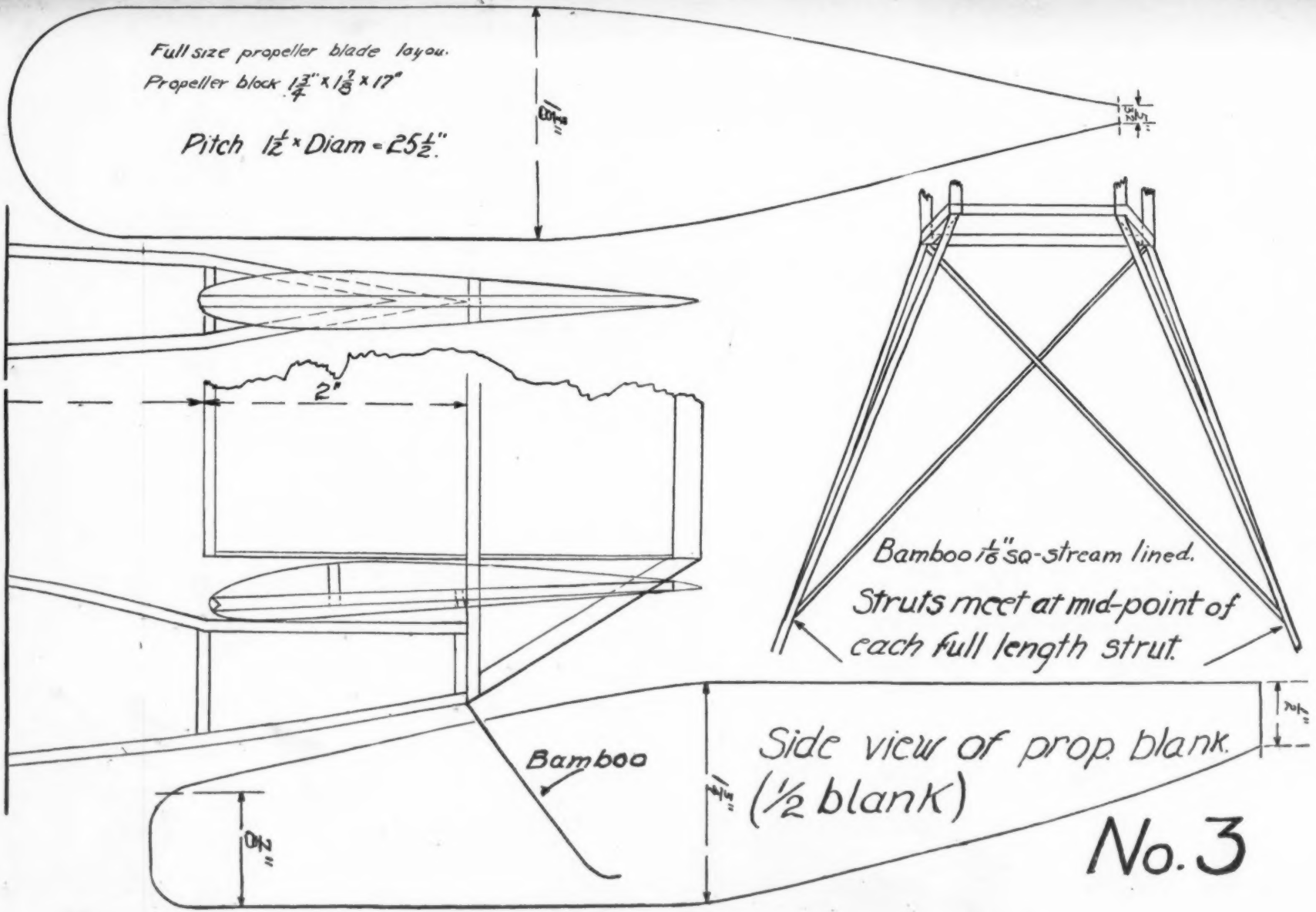
Fuselage

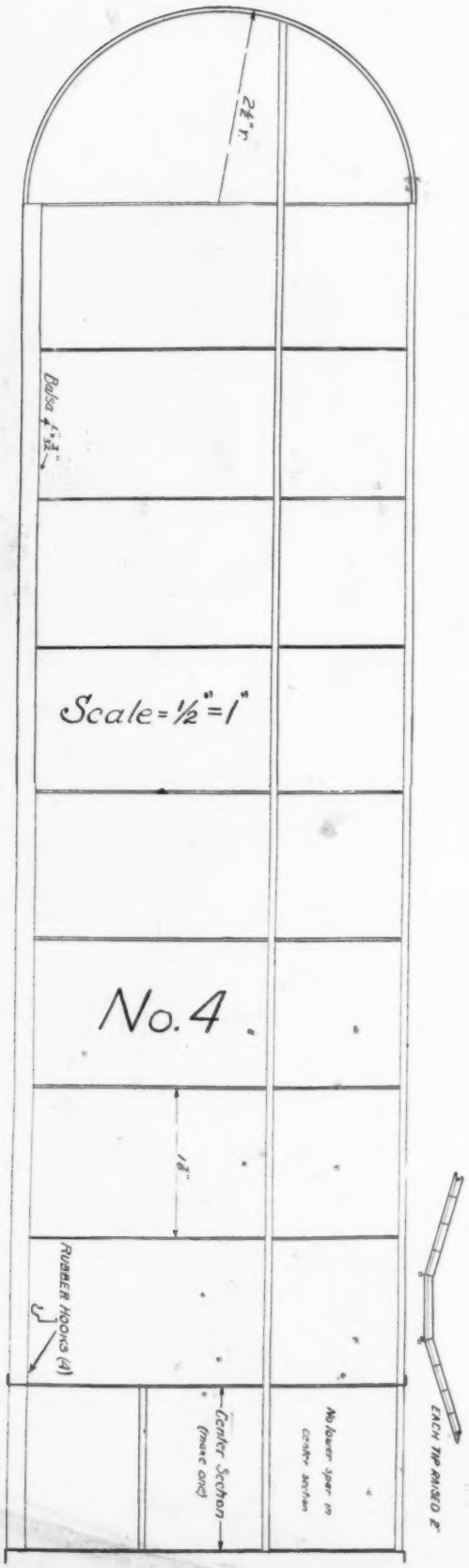
Pin the fuselage longerons, 3/32 square, along the outline of the side of the fuselage, making sure the wood has been soaked in hot water and is pliable. Allow the longerons to dry thoroughly before ambroiding the braces in place. The wood will have to be broken at several places to follow the outline, but ambroid will make the joint strong. As soon as the wood has dried, ambroid the vertical braces in position. Complete both sides and make sure they are identical.

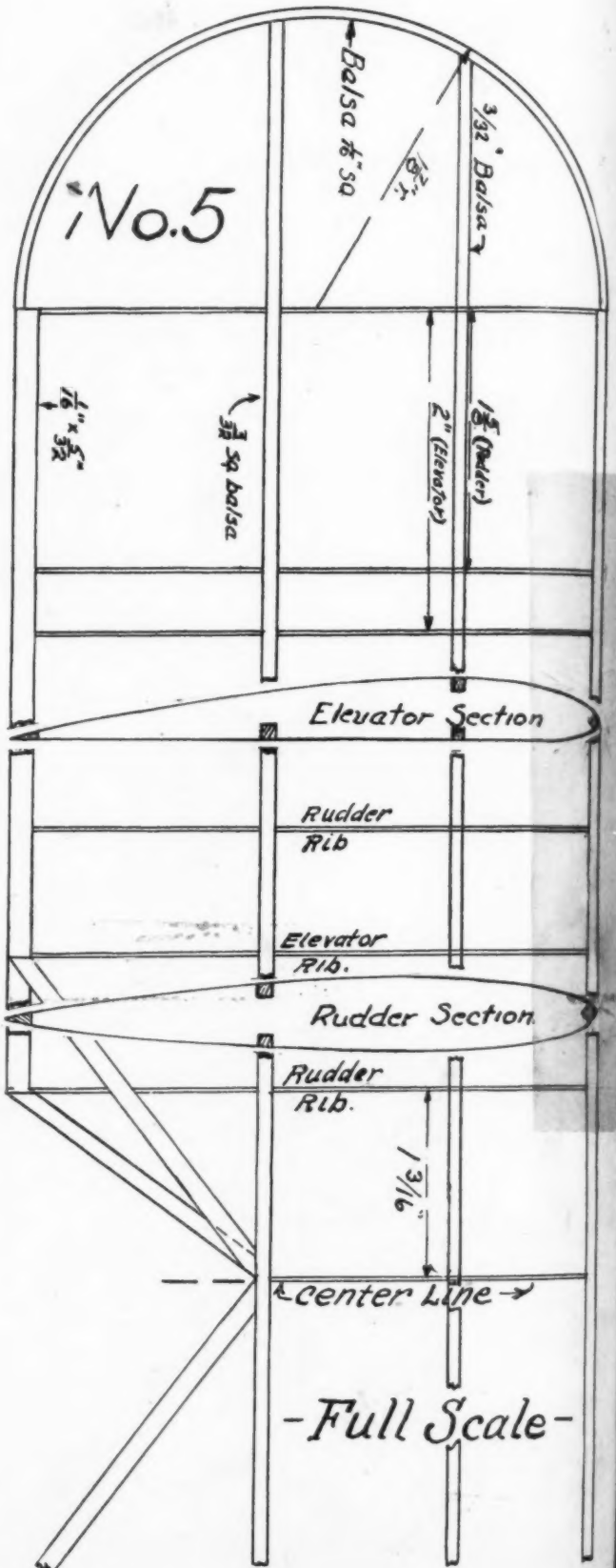
The two halves are joined by ambroiding four balsa pieces, 1 13/16 long, in position. That is where the wing is placed on the fuselage. By pinning these pieces in position until dry, the fuselage will hold the correct shape. Make sure the cross section is a perfect rectangle. The remainder of the braces are then glued in position. A bamboo nose ring is shaped to the figure shown on the drawing. This is glued to the four front ends of the longerons. Before gluing the nose ring, trace its outline on the balsa wood nose block which is carved as a nosing. Next the motor stick is prepared. If channelled wood is not available, solid wood of greater dimensions may be used. When the balsa top is ambroided a good method to follow is gluing a small portion at a time and wrapping a rubber band about the part to keep it in position, then ambroid about two inches farther and wrap another rubber band about the part. Using this method the entire stick can be glued in a short time. I have found that the motor stick serves best when used with the cap on top. Attach to the stick the rear hook which is bent from heavy wire. The motor stick is secured in the fuselage by means of two wire clips which are bent from medium wire. One of these clips is ambroided to the bamboo nose ring and the other to the braces at the rear of the fuselage. The balsa nosing is fitted to the stick by cutting a notch and ambroiding. Be sure that the nose block makes a perfect fit with the bamboo ring. At a distance of ¼ inch above the top of the motor stick, ambroid a punched clothing snap on the nose. This serves as a propeller bearing.

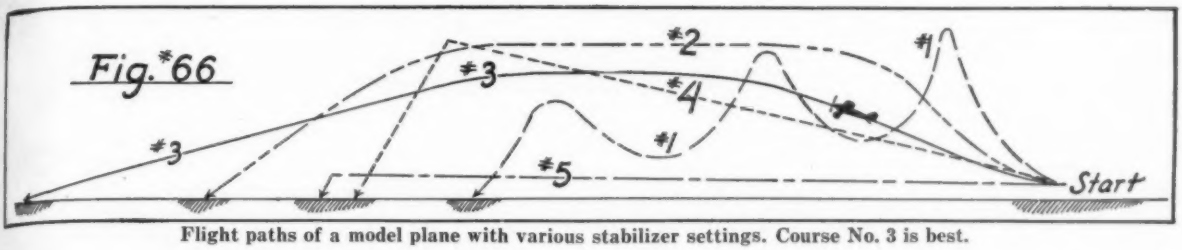
(Continued on page 42)


No. 2.
Clark-Y-Wing - Section
3½"
3½"
3½"
Heavy wire.
end plug
Fitting to hold stick in clip
longerons 3/32" sq
Clip Support for Motor Stick.
GSL


Full size propeller blade layou.
Propeller block 1¾" x 1⅝ x 17"
Pitch 12½ x Diam = 25½"
2"
Bamboo 1/16" sq-stream lined.
Struts meet at mid-point of each full length strut.
Bamboo
Side view of prop. blank.
(½ blank)
No. 3


24"
Balsa 1/32"
Scale = 1/2" = 1"
No. 4
18"
RUBBER HOOKS (4)
Center Section
(make one)
No lower spar in center section
EACH TIP RAISED 2"


No. 5
Balsa 1/8" sq
3/32" Balsa
6 1/2"
1/8" x 5/32"
3/32 sq balsa
2" (Elevator)
1 3/8" (Rudder)
Elevator Section
Rudder Rib
Elevator Rib.
Rudder Section
Rudder Rib.
1 3/16"
℄ center Line
-Full Scale-



Flight paths of a model plane with various stabilizer settings. Course No. 3 is best.

The Aerodynamic Design of the Model Plane

Secrets that will Take the Stalling Tendency Out of Your Models, and Give Them Remarkable Longitudinal Stability

By Charles Hampson Grant

ARTICLE No. 16 CHAPTER III

IN OUR discussion regarding the problem of longitudinal stability last month, the factors of design were considered that have a disturbing influence upon a plane in flight. These features of design which cause or promote *instability,* must be balanced by corrective influences, operating with such magnitude and at such an instant that the plane will not lose its flight balance, or will at least recover its balance after having deviated from its true flight attitude. It is our problem now to determine *what* means we can use and *how* to use such means to create the highest degree of stability.

It has been found that the design features which we can use to accomplish the desired results are as follows, listed in the order in which they will be considered:

1. The angle of chord of the stabilizer to the line of flight (center line of propeller shaft), as compared to the angle of the wing to the line of flight.
2. The distance of the stabilizer from the wings. (The length of the stabilizer moment arm). See (X) Fig. No. 65.
3. The area of the stabilizer.
4. The position of the center of gravity relative to the center of lift, considered in a vertical plane.

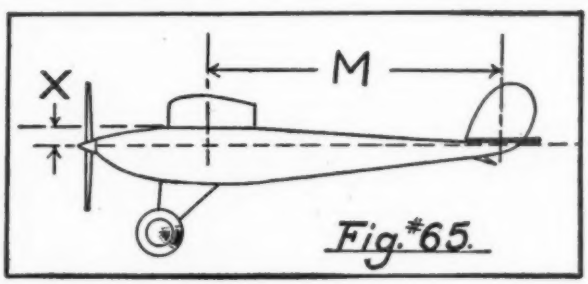
Now, suppose we consider factor (No. 1). One of the important things we know about it from our discussion last month is that it is a disturbing factor as well as a corrective one. We stated then that if the stabilizer should be set at an angle of two degrees less than the wing to the line of flight, its disturbing effect would not be very great. If the angle is larger than this, the plane will have a decided tendency to stall at high speed. On the other hand, the larger this angle, the greater the force will be which tends to force the ship *back* into proper balance after it has been displaced. We must compromise. A setting must be chosen which will not cause great disturbance and yet which will provide an angle of the stabilizer large enough to correct the attitude of the ship after any disturbance.

From the results of many experiments it has been found that *the stabilizer should be placed on the machine so that it is two or three degrees less than the angle of incidence of the wing.* (The angle of incidence being the angle between the chord of the surface referred to and the center line of the propeller shaft). This setting will not cause sudden stalling and a consequent sudden diving but rather will produce moderate though effective actions and reactions.

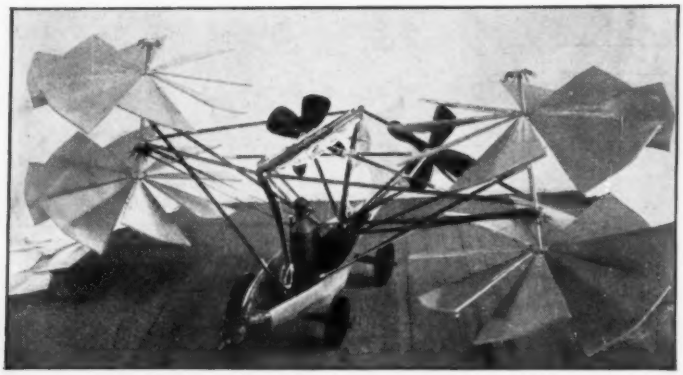
IF the stabilizer is set at a greater negative angle to the wing than 2 or 3 degrees, it is apt to cause steep climbing with a resultant stall from out of which the plane dives steeply. A large negative setting will also produce a very steep glide at the end of the flight when the model is correctly adjusted for normal flight under power.

When the stabilizer is set at an angle to the wing of less than 2 or 3 degrees negative, say zero degrees, there will be very little nosing-up tendency but also, the plane will lack the ability to recover its balance when thrown out of its normal flight course by a wind gust. It is possible to obtain excellent flights with some models when the difference in angle between the wing and stabilizer is only one degree. However, the average setting is about (2) degrees less than the wing. This will usually prove quite satisfactory. Fig. No. 66, shows the normal flight courses of models with three settings discussed here. Dotted lines No. 1 and No. 2 show two possible courses resulting from a large negative setting, say about (4) degrees. The model will fly in one course or the other, depending upon the setting of the wing. Line No. 3 shows the course of a model with a stabilizer setting relative to the wing of (–2) degrees, and lines No. 4 and No. 5 indicate two possible paths of a model with no negative setting of the stabilizer.

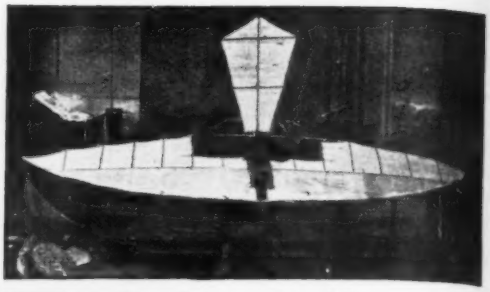
All of the statements made so far regarding stabilizer setting, refer to models on which the center section of the wing is about on a line with the center line of the rubber motor (line of thrust) or very slightly above it; just enough for clearance. It is *(Continued on page 36)*



It would be greatly appreciated if our readers would write and tell us whether or not they would care to see this series of articles printed in book form. (Editor.)



One of Sir George Caylay's helicopters, now in the National Museum at Washington, D. C.



The Stringfellow model, which, in 1848 made a flight that will be remembered as long as aviation exists.

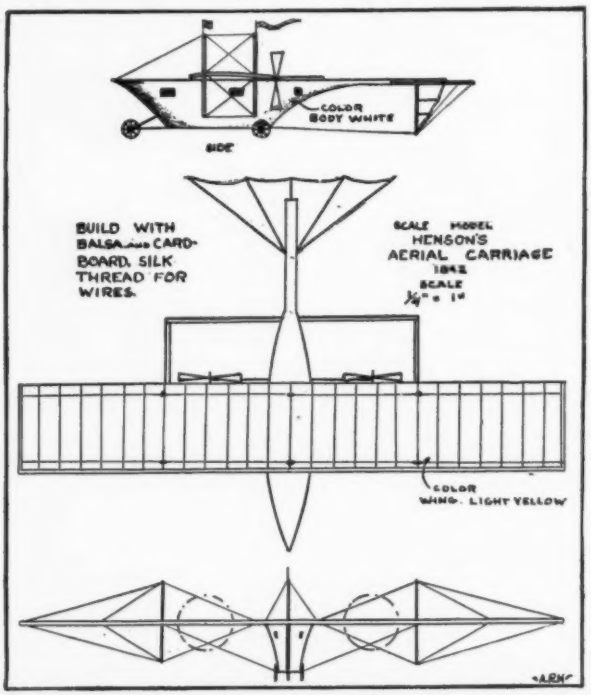
John Stringfellow who, through untiring efforts and study, built the airplane that made the first recorded power-driven flight.

Who Developed the Airplane?

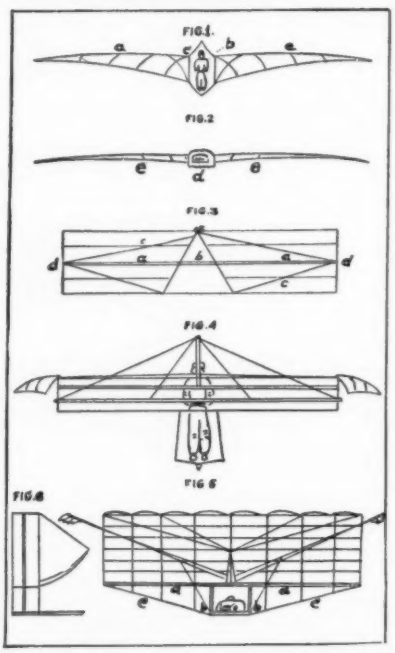
The First of a Series of Articles Telling Briefly of the Pioneers of Aviation and How They Laid the Foundations of Modern Aeronautic Science

By Alan Moulton

THE idea of flying through the air on wings has interested men of an inventive trend of mind for centuries. There are quite a few legends pertaining to flight but Leonardo da Vinci, in 1495, made the first actual experiments relative to man flying. Da Vinci designed a flapping wing device, which he patterned after the sea gull, and devised a method of building a parachute, though he never materialized it. Of course we know that ornothopters, or flapping wing devices, are impractical but Da Vinci must be considered one of the fathers of aeronautics because of the interest his drawings and articles created among the following aeroplane inventors.



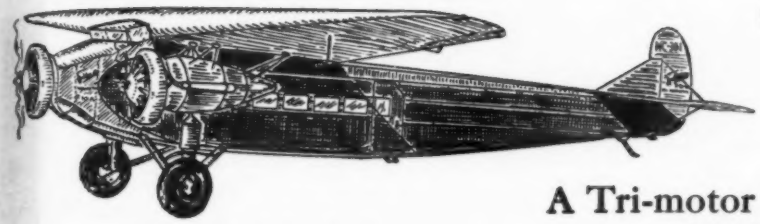
Henson's aerial carriage. It embodied all the fundamental factors of flight but never passed beyond the drafting board stage.



Wenham's diagrams of super-posed surfaces (multiplanes) used by him in his lectures on aeronautic science.

The man to whom the title of, "Father of Aeronautics," justly belongs is Sir George Caylay, an English squire, whose extensive experimenting with gliders, in 1809 and 1810, established the facts that wings should have curved surfaces rather than flat surfaces and that supporting surfaces should be fixed rather than the flapping devices suggested by Da Vinci and others. Caylay also showed how the pivoting of the tail plane could make it act as an elevator when it is moved up and down. He indicated how wings uptilted at a dihedral angle would aid lateral stability. He was the first to suggest the use of an internal combustion engine as motive power for aircraft. It is difficult in a brief summary to give an adequate idea of all that Sir George Caylay really did. A book should be written of his work alone. You can readily see why he is

(Continued on page 43)



The Fokker F-10-A

A Tri-motor Transport Model for the "Solid Scale" Builder

By Robert L. Anderson

NOTICE—Plans on Pages 18 and 19

HERE is a ship that has rendered valuable service on many important air transport lines, such as W.A.T. and T.A.T. lines. It is a beautiful looking ship and should make a striking looking scale model.

Before going into the construction of this plane, it might be well to know a few of the important facts about it. The principal dimensions are as follows:

Span 79′ 3″, chord (max.) 14′ 2″, length 50′ 7″, height 12′ 9¼″, tail plane span 19′ 5¼″, wheel tread 15′ 6″.

The Pratt and Whitney 420 h.p. "Wasp" engines are equipped with three-bladed propellers and pull the plane through the air at a top speed of about 140-150 m.p.h.

The accompanying plan is drawn exactly to the scale of one-quarter inch equals one foot. Because of the complication of such a model, good photographs are almost indispensable, and if access can be gained to the real plane it will be very helpful for detail work. No interior is shown, and it is recommended that the builder use celluloid, which is either frosted or painted silver, in the cabin windows. Ample space will be found for a small storage battery and flashlight bulbs. By constructing the plane half again, twice, or even three times as large, it will fit standard celluloid motors advertised by most of the leading model aircraft concerns in this magazine. Cowlings may also be secured for these motors and the installation of one is shown on the right motor. Treaded wheels will add to the appearance of your model; the big ship uses forty-four-inch tires. A tail wheel is optional, as are the four lead balances on the ailerons; some planes have them, some don't.

IN building the cabin, I suggest the use of one-eighth inch flat balsa and a built-up wing should have twenty-nine ribs and thirty half-ribs which continue back as far as the rear spar and which are placed one between each full rib and one between the outer ribs and the wing-tips. This method of construction will look more realistic and should cost less, but a solid fuselage and wing will stand more knocking about. If you don't make your control surfaces movable, at least groove them.

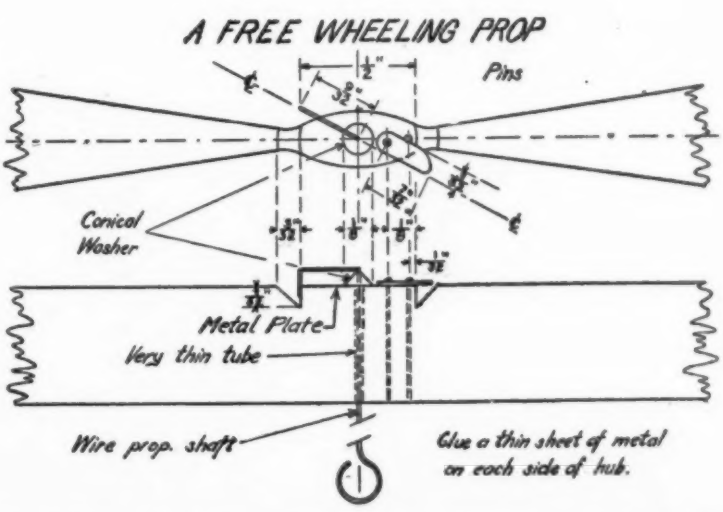
Various color schemes will prove effective, but the one from which this plane was detailed is as follows:—wings and tail surfaces—orange; cabin windows bordered with yellow; bull's-eye on wheel of the same; black fuselage; black wing lettering; black tail border and lettering. The motor nacelles and struts may be either silver or black.

Let the Glide Improve Your Flights

A Simple and Efficient "Free Wheeling" Device for Your Contest Model That Will Reduce Head Resistance and Lengthen the Glide

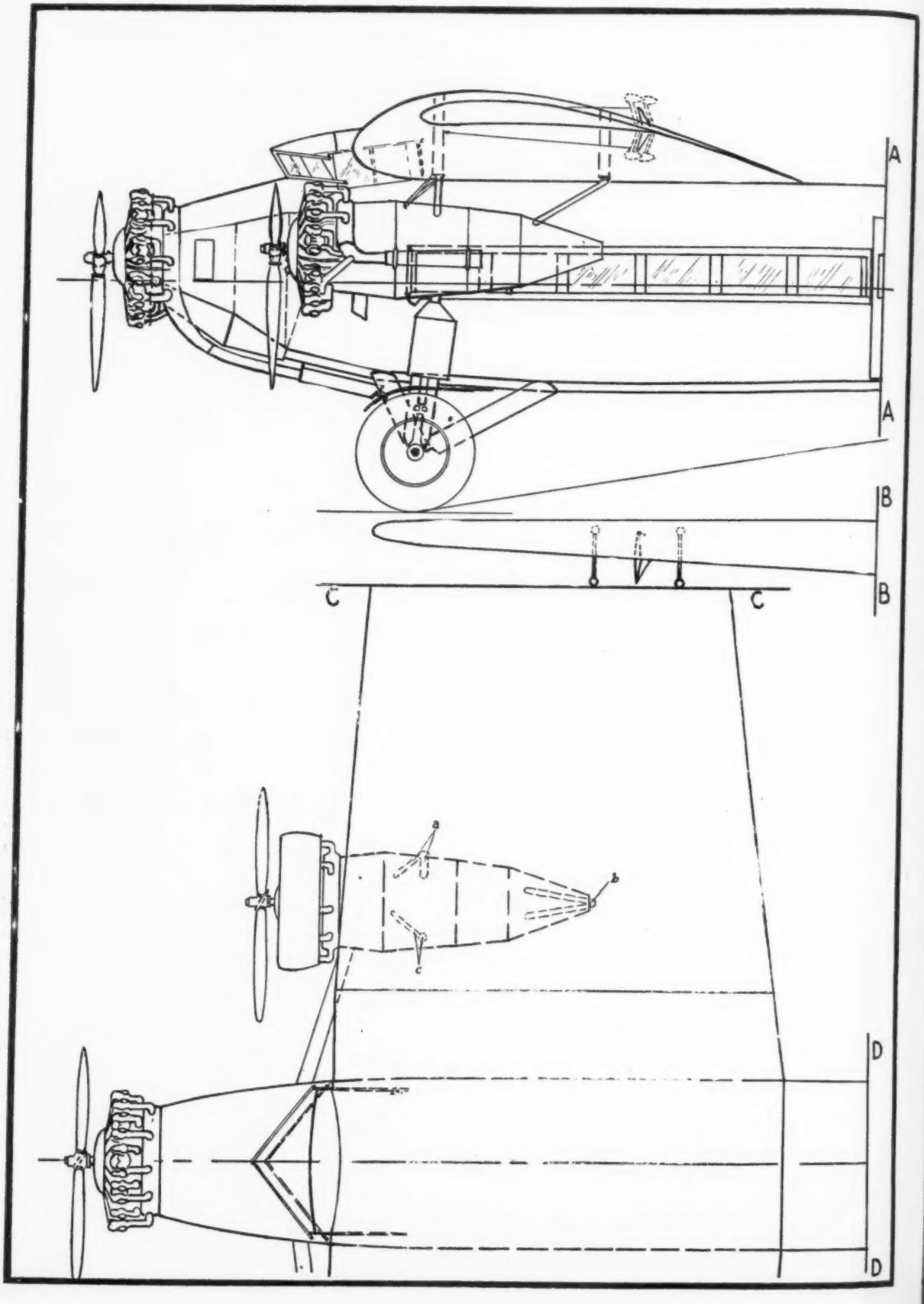
By Gene F. Rose

PRESENT day designers of outdoor models are depending more and more upon the gliding qualities of their ships for duration of flight. One of the most successful practices is to give the model plenty of power in order to insure extreme climbing ability. In this way, it is possible to have it reach a high altitude before the motor power runs out. The model then glides back to earth, consuming a goodly number of seconds and perhaps minutes, depending upon the maximum altitude that it reaches and the existence of up-drafts. In fact, a model may be made to fly for hours by this method.



However, there is one feature in the design of many models that reduces the soaring ability of a plane to a considerable extent. This is the fact that the "dead" propellers create a tremendous drag after the rubber motors have fully unwound. This causes the model to glide at a very steep angle. Consequently, it reaches old Mother Earth very quickly and cuts down the endurance of the flight.

However, if the propeller can be equipped with a release device which allows it to spin *freely* while it is gliding, the resistance to forward motion will be very small and the glide will be long and flat. This *(Continued on page 45)*


A
A
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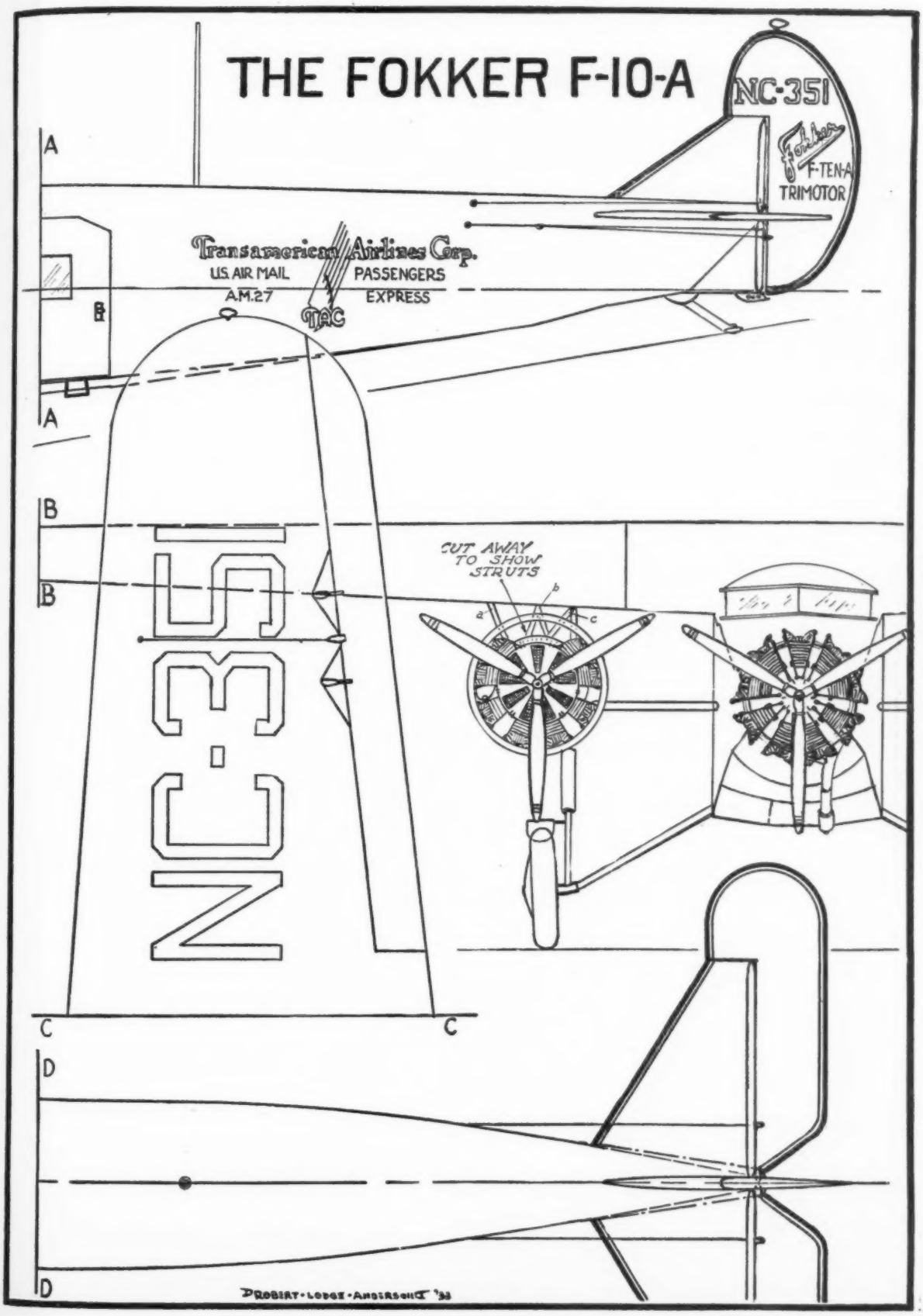
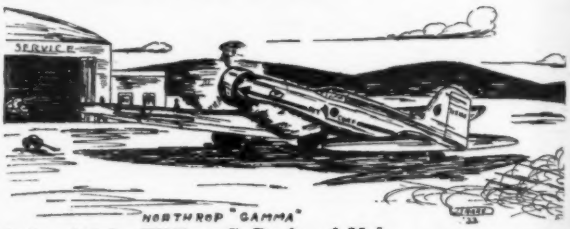

THE FOKKER F-10-A
NC-351
F-TEN-A
TRIMOTOR
Transamerican Airlines Corp.
U.S. AIR MAIL
A.M.27
PASSENGERS
EXPRESS
TAC
A
A
B
B
NC-351
CUT AWAY TO SHOW STRUTS
a
b
c
C
C
D
D
PROBST-LODGE-ANDERSON '33

The Fokker tri-motor F-10-A, plans of which appear on the preceding pages.

AIR WAYS

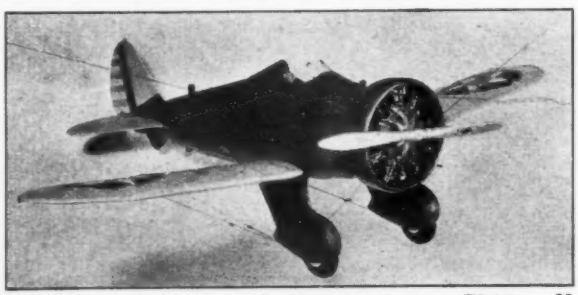
HERE AND THERE

Get Busy and "Air Your Ways" of Building and Flying Model Planes. In This Column, Space Will be Devoted to the Activities of Our Readers. Let Others Know What You are Doing

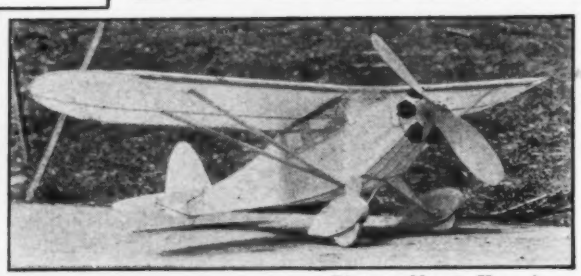


A drawing by William C. Drake of Malden, Mass., showing Capt. Hawks' New Northrop Gamma coming in after a flight.

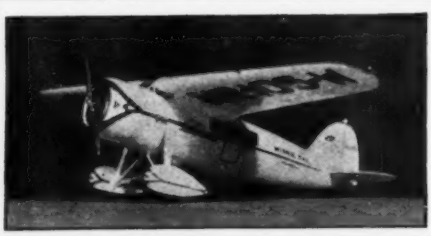
Universal Model Airplane News, in behalf of its staff and readers, wishes to extend the greatest sympathy to the relatives and friends of those who lost their lives in the recent Akron disaster. The loss of these men is an irreparable blow to aviation and the unselfish service which they have rendered to the nation can never be fully realized or over-estimated.



Picture No. 1. A beautiful flying detail scale model of a Boeing XP-936, built by Bud Baldwin of Dayton, Ohio.



Picture No. 2. Here is a flying Monocoupe built from plans in this magazine, by R. W. McKee of Zanesville, Ohio. It weighs a little over 3/4 of an ounce.

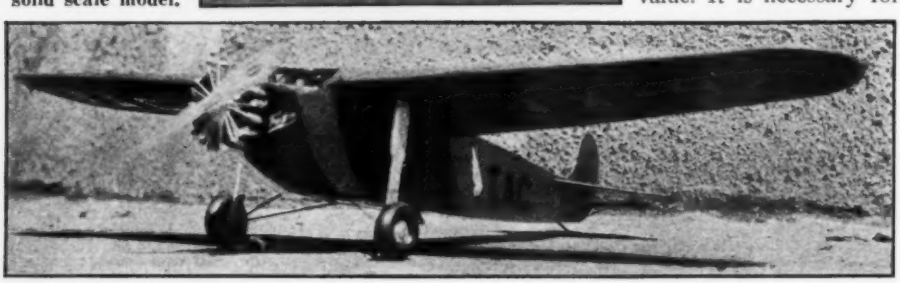


Pict. No. 4. A neat-looking Lockheed Vega, built by Hugh Butterfield of Momence, Ill. 13½" wing span solid scale model.

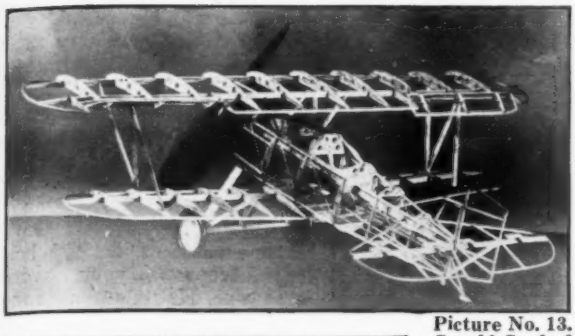
OUR readers can prepare themselves for some very interesting news this month. You may have noticed that it has been necessary to extend the number of pages devoted to Air Ways. Not only that, but we have some big news for you, which, however, we will hold until a little later. (See page 25.)

A large number of young artists have contributed drawings to be printed in Air Ways. This month, we have selected one drawn by William C. Drake of 123 Clifton Street, Malden, Mass., to embellish our Air Ways heading. If you have submitted a drawing and it does not appear in any issue, do not feel that your work has not been appreciated or that it is not of exceptional value. It is necessary for us to limit the publication of such drawings to one or two per month.

The most exceptional picture, in our opinion,

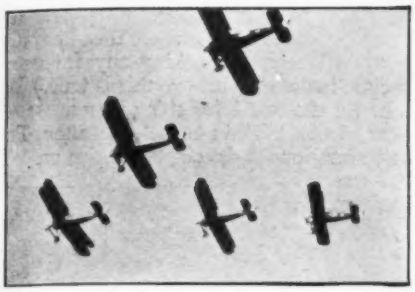


Picture No. 5. One of the prettiest "jobs" we have seen, a Fokker Super Universal by William Howell of Detroit, Mich. It flies beautifully and weighs only one ounce.



Picture No. 13. Gerald Cord of San Antonio, Texas, crashes thru with a picture of his Boeing skeleton.

Picture No. 11. Cloyd Smith of South Bend, Indiana, has made an excellent job of this Keystone Loening Amphibian, solid scale model.



Pict. No. 3. A flight of Sopwith Snipes built by Russell Park, St. Paul, Minn.

which we have received this month is picture No. 1, which shows a Boeing XP-936 built by Bud Baldwin, 802 Cincinnati Street, Dayton, Ohio. Close examination will disclose that he has taken great care in his construction and has included all details. All the small parts were made by hand. He tells us that it is built to fly and believes that it will perform very well, although he has not attempted to fly it yet. I don't blame him for waiting for a perfect day for the first take-off of this ship. It would be quite a loss if it crashed.

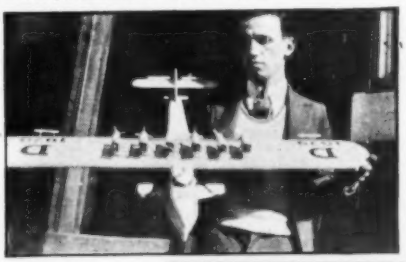
Picture No. 8. Joe Nieto of San Antonio, Texas, gets ready to launch his pusher.

R. W. McKee of 702 Ridge Avenue, Zanesville, Ohio (Ohio boys seem to be very active this month), sends us picture No. 2 of his Monocoupe, which he built from plans in the magazine. He is very emphatic in his praise of Mr. Howard McEntee, who designed the ship. He tells us that the ship weighs 39 grains over three-fourths of an ounce and when completed was in perfect balance. As many model builders know, it is often necessary to weight the nose of a model in order to give it the proper balance for flight. When this does not have to be done, it indicates clever designing. McKee tells us that this ship takes off and lands perfectly every time and has never stalled. It flies consistently about 200 feet, r.o.g.

At present, Mr. McEntee is busy with more plans which, I believe, will please our readers when published.

Pict. No. 9. Miss Viola Gentry, aviatrix and Al Solomon, readers of U. M. A. N.

HERE we have a very unusual photograph, picture No. 3, which has been submitted by Russell Park, 1670 Stillwater Avenue, St. Paul, Minn. This picture shows a flight of five Sopwith Snipe models which he has built. As you can probably imagine, these ships are not in actual flight but have been cleverly strung on wires to give an effective appearance. Those who have tried to string models on wires and take pictures of them can realize the difficulties involved in getting this picture without having the wires show or having the picture include some detail which would spoil the effect. This is only one of Park's fleet of planes. He has another fleet of six Boeings, one Curtiss Hawk and one Douglas O-38, all ready for active service.

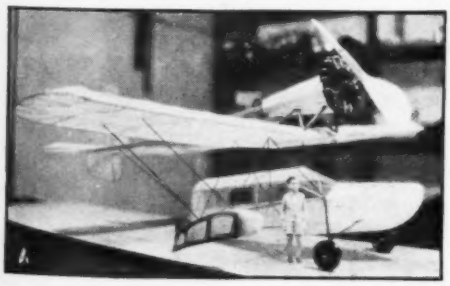


Picture No. 6. Mr. Cavanaugh of Philadelphia, Pa., and his model DO-X.

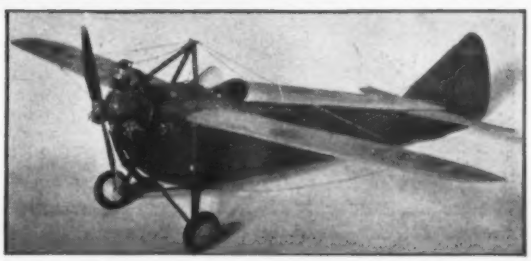
Hugh Butterfield of 311 North Walnut Street, Momence, Illinois, sends us picture No. 4, a 13½-inch solid scale Lockheed Vega. It is a very neat-looking job. As the picture indicates, he has mastered the technique of painting his models. Many paint jobs spoil otherwise well-constructed ships.

Picture No. 5 shows a Fokker Super-Univer-

Picture No. 10. Harry E. Moyer of Lebanon, Pa., gets his "hydro" off the water for long flights.

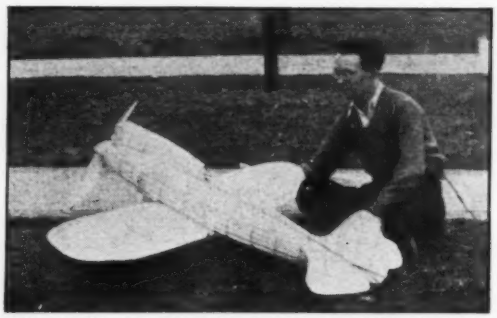


Pict. No. 12. A Sikorsky Amphibian by Norman Kasiner. A brother is beside it?



Picture No. 14. Detail scale model Buhl "Bull Pup" won Buhl Co. competition. Built by Audrey Robinson, Houston, Texas.

sal, built by William Howell of 1718 Parker Avenue, Detroit, Mich. Although Mr. Howell did not sign his name to the letter, fortunately we kept the envelope which disclosed his identity. This model is a "flying scale" and weighs less than one ounce. Howell states that he is having all of the small three-view drawings which appeared in the magazine photostated to a larger size, 18"x24". He says it is much better than scaling them up. The cost is 90 cents each. Though this may seem expensive to some readers, I believe it would be well worth their while to do this with the ships in which they are particularly interested. We will be pleased to know more about the flights of this Fokker when Howell gives it a further trial.



Picture No. 15. Hyp Dauben, Jr., and his six-foot flying Howard "Pete." The plane has a twenty inch propeller.

Edw. B. Cavanaugh of 2756 North Second Street, Philadelphia, Pa., submitted plans for a DO-X to us some time ago. Unfortunately these plans were lost in the mails. We regret this extremely as we had hoped to publish them for the benefit of our readers. However, Cavanaugh has sent us picture No. 6, in which he is shown holding the model of the DO-X. When we receive new plans of this ship, we will be pleased to publish them for the benefit of our readers, should they prove entirely satisfactory.

Charles A. Lewis of 507 South Rich Street, Roswell, New Mexico, sends us another picture of his model of 56-inch wing span. It is shown making a beautiful flight in picture No. 7. He tells us that it will gain an altitude of 200 feet easily. It weighs 7½ ounces.

JOE Nieto of 2021 South Hackberry Street, San Antonio, Texas, is a very busy young man. He has taken up an interesting phase of aviation. Picture No. 8 shows him with one of his twin pushers. He is not only a model builder but he makes a business of collecting original photographs of all kinds of airplanes, including many unusual war-time shots. He says: "My entire collection numbers over one thousand original photographs. I carry on tradings with seven foreign nations and would like to hear from fellows all over the world." In respect to his model work, he says: "I am working on experimental types of models with the intention of adapting more feasible and practical methods to pursuit aircraft. My work is centered on flying wing types." Nieto is giving us a very good illustration of the excellent use to which model aircraft designing may be put to promote the advance in large plane designing. If anyone is in need of photographs of any particular type of airplane, I suggest that they write to Mr. Nieto. Unquestionably he will be able to be of service.

Picture No. 9 illustrates a firm friendship that has been built up between Al Solomon of 2525 Grand Concourse, New York City, and Miss Viola Gentry, the famous aviatrix, because of UNIVERSAL MODEL AIRPLANE NEWS. Miss Gentry is shown at the right. Al is holding a copy of your favorite magazine. He tells us that they both take great pleasure in looking through its pages. (In consideration of the fact that he is not asking any favors of us in his letter, we are inclined to believe this is true.) We wish to extend our thanks to Al for this picture.

Harry E. Moyer of 612 Walnut Street, Lebanon, Pa., has been working industriously, developing hydro models. He had great success, as picture No. 10 indicates. It shows one of his ships getting off the water and climbing for altitude. Other remarkable pictures of this machine in flight have been submitted, which, we regret, we are unable to publish due to the lack of space.

Picture No. 7. A 57-inch span model in flight, built by Charles Lewis, Roswell, New Mexico.

Picture No. 11 shows a very excellent model of a Keystone Loening Amphibian built by Cloyd Smith of South Bend, Indiana, Y.M.C.A. It is a very neat looking job. The wing span is 24 inches and equip-

Pict. No. 16. A beautiful Hawk P6-E by H. Chamberlin of Elyria, O.

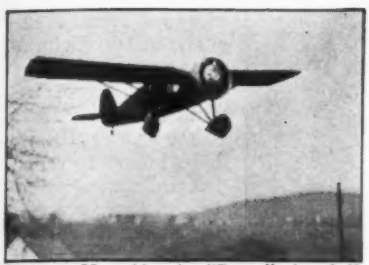
Picture No. 18. A flying model Heath Parasol by Harold Livengood, Cheyenne, Wyoming.

Picture No. 23. Members of the Lakewood Model Speed Foundation.

Picture No. 24. Claire Kube and prizes he won at Islip Meet.

Picture No. 22. A group of the winners in a contest held in Chicago, under the auspices of the Aeronautical Association of America.

Picture No. 21. A display of eighty models built by members of the Trenton Model Club.



Picture No. 19. A "Ryan" in full flight? Mike Hudock built this fine model.

Picture No. 20. Leo Rohon, Nanticoke, Pa., is responsible for this speck in the sky, a 30-inch smoke plane.

ment includes four seats and a cabin light which is hooked through the landing gear.

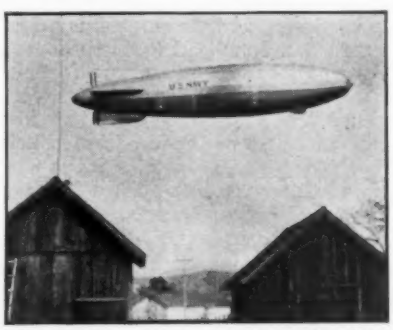
PICTURE No. 12 shows a Sikorsky Amphibian with the brother of the builder standing close to the hull of the ship. Of course, you will realize that this is merely a picture of the brother placed in such a position that it gives a very realistic effect. Norman Kasiner of 179 Crawford Street, Rochester, New York, is responsible for this "layout." He tells us that the picture was taken in his shop. Two 40-watt bulbs were used. It required an exposure of 2½ minutes. The plane was built from 5-inch wing span drawings. It makes some very fine flights and weighs only 2½ ounces.

Our good friend, Gerald Cord of 301 South Olive Street, San Antonio, Texas, sends us picture No. 13, which shows the skeleton of a Boeing Pursuit model which he has recently constructed. It is a very nice looking job. It also flies very well. A picture of this machine in flight was submitted, which shows what the model can actually do in this line. However, it was not clear enough for publication, due to the speed of the model.

The Buhl Aircraft Corporation some time ago sponsored a national model airplane contest. The models submitted were to be constructed in detail. Some very fine machines were entered. One of these machines, built by Audrey Robinson of Houston, Texas, the winner of the contest, is shown in picture No. 14. It is a Buhl Bull Pup. The wing spread is about 18 inches. All details have been faithfully carried out. Some of the unusual features are the dummy engine, movable controls, tiny life belt, windshield made of isinglass, an instrument board carrying the usual equipment in the line of instruments and the tiny control stick. So you see this is certainly a most excellent piece of craftsmanship.

Hyp Dauben, Jr., of 2159 Fairfax Road, Columbus, Ohio, built a 5-foot model of the Howard "Pete" for the annual Scout circus held at Columbus last March. Dauben, with his machine, is shown in picture No. 15. The chord of the wings is 12 inches. It has no movable controls as it is built to fly. This model has attained a duration of 30 seconds consistently and climbs to an altitude of 40 feet, flying in a one hundred-foot circle. The ship uses a 20-inch propeller and 32 strands of ⅛" flat rubber. The wings are equipped with wing slots, which have proven very successful. Dauben has built all kinds of planes and has made some remarkable flights. One flight of 16 minutes was made with a twin pusher. A Wakefield model flew for 17 minutes and he has lost three gliders which have flown out of sight.

One of the neatest models that we have ever seen is shown in picture No. 16. It is a Curtis Hawk P6 E, built by H. Chamberlin of Elyria, Ohio. Mr. Jerald Smith of 163 West Avenue, Elyria, Ohio, has been kind enough to send us the information concerning this ship. The remarkable feature about this model is that it is a beautiful flyer. The machine is complete to the last detail and is painted regulation army colors. The care with which this model has been made may be seen distinctly from the propeller. Usually this one feature on an airplane tells the degree of accuracy to which ships are built.



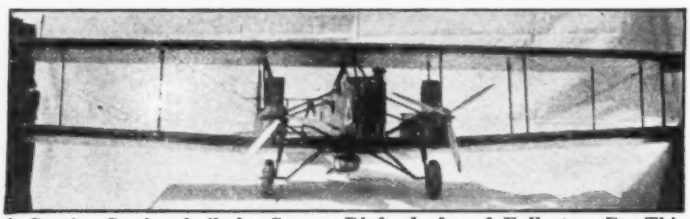
Picture No. 17. A model of the late Akron, ingeniously built by Fred Mast, Medford, Oregon.

FRED Mast of Medford, Oregon, Route 4, has been kind enough to send us picture No. 17 of his model of the Akron. The workmanship on this model, as shown by

Picture No. 26. Some important members of the Connecticut Model Airplane Association. They are, Blair Watson, John Gunther, Herbert Owen and Julius Safanski.

Picture No. 25. Prize winners at the Islip, N. Y., Model Contest.

the picture, is better than in any model of the Akron that we have seen. It looks very realistic indeed. The model is 33 inches long and was made from plastic lath strips, 1/16x1/8". Mast went to great trouble to saw these out with a hand-saw. Cardboard boxes, cut into circles, act as formers. The tail surfaces are made of balsa wood. The whole ship has been treated with ten coats of silver airplane dope. The propellers, which are ½" long, were cut out from an old aluminum stew pan. We would say that Mast is most ingenious in adapting the things around him to his use. This often indicates latent genius. Anyone can make model planes when all the facilities are placed in his hands, but the ability to create your own facilities and tools is a very praiseworthy quality. It took 50 hours to complete the ship.



A Curtiss Condor, built by George Diefenderfer of Fullerton, Pa. This town is active in model aeronautics.

Harold Livengood of 208 East 24th Street, Cheyenne, Wyoming, presents picture No. 18 of his Heath Parasol. He tells us that when the weather clears sufficiently, he will send us a flight picture of this machine. It seems that the weather conditions have to be ideal before they can fly model planes in Cheyenne for, as Livengood states, they live near the stratosphere.

Picture No. 19 shows a Ryan Monoplane in full flight. At least, so it appears. However, Mike Hudock of 215 4th Street, West Easton, Pa., has been honest enough to tell us that he "faked" the picture, stringing the model on wires to give the appearance of flight. We admire him very much for his honesty and the posing of the picture certainly *(Continued on page 39)*

Foreign Activities

VERY little information has come to us from foreign lands this month. However, we have one item of unusual interest, which has been sent in by Mr. Ivor Freshman, General Secretary of the Model Flying Club of Australia.

Here it is:

"Shortly after launching a model plane at the club's outing at Box Hill, I saw a hawk hovering in the air, some distance about it. The hawk suddenly folded its wings, dropped like a stone to the ground. The next moment, it was struggling with a rabbit. It flew with its victim to a height of about 25 or 30 feet. By this time, the model plane was about to make a landing close to the hawk. The bird saw it and dropped the rabbit, darting at the plane which was then about three or four yards in front of him. Swooping down on the model, it struck at the little plane with its talon, piercing its wings and tearing the fabric. The plane dropped to the ground and the bird flew away. The fabric on the right half of the model's wing being badly torn.

"At the meet at which this incident occurred, the following outstanding times were recorded by members of the club:

"Reginald Searle of the Concord Club, stick tractor, 13 min., 2 seconds. Gordon Ratcliffe also of Concord, stick tractor, 11 min., 7 2/5 seconds. Ratcliffe also put up a seaplane for 1 min., 37 seconds. Other flyers who flew for more than 4 minutes were, Richard Boon, Mervyn Morgan, Robert Hodgins and James Guyatt."

Editor's Note:

Mr. Ivor Freshman in relating this story of the attack of the hawk on the model plane, asks me if I have ever experienced anything like this. I am answering him with the following story.

Way back in the dim ages of model building, in the year 1913, I chose to fly a newly made twin pusher, on a quiet, balmy evening at Peru, Vermont, U. S. A. The flying field was a rolling plain surrounded by forest native to this region. It was not until I had launched the ship into flight that I noticed the air was more or less crowded with birds which we know here as night hawks.

The little ship gained the altitude of about 150 feet very quickly, wending its way through the flock of hawks like a thing alive. Probably the hawks took good care to get out of its way. However, at last one venturesome bird resented the intrusion. He started to circle the little machine with shrill cries and a belligerent attitude. Finally, after the ship had made several circles with the hawk trailing closely behind, this night hawk made a sudden swoop down upon the plane. The plane in this case was more fortunate than the one which was the hero of Mr. Freshman's story, for the hawk attacked the ship from the rear instead of from above. In those pre-balsa wood days, model propellers were cut from basswood and pine which is much harder than balsa wood. Well, it so happened that the aim of the hawk was perfect and he stuck his head directly into one of the propellers revolving at high speed, at the rear of the pusher.

Mr. Hawk did not have much chance to be surprised or show any unusual emotion for he was knocked cold. He dropped for about 50 feet before collecting his wits and flying off with loud cries. After this incident, I noticed that the rest of his family kept at a safe distance from the machine.

1933 Official National Championship Model Airplane Meet

THE time has arrived for model builders of all sizes, shapes and ability, to tune up their miniature air buggies for the biggest event of the year, the official National Championship Model Plane Meet, sanctioned by the National Aeronautic Association. If you do not think that it is going to be the biggest and best contest of its kind ever held, read on and judge for yourselves. It will be held in or near New York City, June 27 and 28, 1933. Write to Mr. Charles H. Grant, Director, Room 1201, 125 West 45th Street, New York City, for entry blanks and complete information. (SEND STAMPED RETURN ENVELOPE.)

The indoor flying events—Indoor Duration and Indoor Fuselage contests—will be held in one of the largest armories. The outdoor flying events—Wakefield International, Stout Outdoor and Mulvihill contests—will be held on an extensive field. These flying conditions should help to provide some fine new records.

In addition to these five flying contests, there will be the National Scale Model event. Send for an entry blank which will tell you where to express your model. Scale models will be judged by a corps of experts, including Mr. Paul E. Garber and Mr. George F. McLaughlin, whom many of you already know. These models will be on exhibition during the two days of the meet and the winners will be announced at the banquet on the last night.

Every contestant will be invited to the banquet. There will be many famous aviation leaders and fliers there. Speeches will be many, interesting and short. The banquet will be a great event, long to be remembered.

There will be an official National Aeronautic Association trophy awarded the winner of each event. There will also be twelve other awards in each event, including cups, trophies and medals. Every contestant has a good chance to win some award with 78 prizes to be given.

To help you get an early start preparing your models, the official rules are published here. But write at once to Mr. Grant for entry blanks and additional important information.

Look on these pages of the June issue for further information and complete official 1933 N.A.A. rules for every kind of model aircraft.

Digest of Rules

National Championship Model Airplane Meet to be held June 27-28, 1933. Sanctioned by the National Aeronautic Association. Sponsored by Universal Model Airplane News

ALL contestants shall be under twenty-one years of age and the builders of their own models. The only parts that may be purchased are the bearings and washers of flying models. No part of a model may be dropped in flight. Models must be flown by their builders. Each contestant will be allowed a total of three models in each flying event, except the Wakefield International Contest. A contestant may enter only one model in the Exhibition Scale Model Contest.

Exhibition Scale Model Contest

Models in this contest may be built to three separate scales. They shall have a wing span of exactly 24 inches, or they shall be built to a scale of ¾ inch to a foot, or to a scale of ⅜ inch to a foot. No model shall be less than 15 inches in wing span nor more than 48 inches in wing span. Models shall be accompanied by a drawing approved by the manufacturer of the plane, giving all dimensions and details necessary to judge the model. The drawing must be of the same scale as the model. Models must arrive in New York City not later than June 20th. Each model shall be a non-flying exact replica of a man-carrying airplane, every part being proportional in size and location to the corresponding part of the large plane. Models will be judged on general workmanship, including neatness, amount of detail, originality, color and finish; and on fidelity to scale.

Wakefield International Contest

ONLY one model may be used by a contestant. Each contestant will be given three trials. Models shall rise from the ground from a standstill. Fuselages must be entirely covered including the motor, fuel tanks, or air containers. Power is optional. Models shall not weigh more than eleven pounds. The minimum value of the largest cross section of the fuselage shall be not less than 1/10th of the length of fuselage squared. Elimination trials to determine the six American entries, will be held, details being given upon arrival at New York City.

Mulvihill Outdoor Contest

Models shall be of the *Stick Model* type and *hand-launched,* with effective main supporting surfaces (wings) of at least 125 square inches area, and shall weigh at least one ounce, avoirdupois, for each 50 square inches of wing area.

Stout Outdoor Contest

Models must be of the *Fuselage Model* and *rise off the ground* types, with effective main supporting surfaces (wings) of at least 125 square inches area, and shall weigh at least one ounce, avoirdupois, for each 50 square inches of wing area.

Indoor Fuselage Contest

Models must be of the *Fuselage Model* and *rise off the ground* types, with effective main supporting surfaces (wings) of no greater area than 150 square inches.

Indoor Duration Contest

MODELS shall be of the *Stick Model* type and *hand-launched,* with effective main supporting surfaces (wings) of no greater area than 150 square inches.

The following definitions are applicable to the above contests:

RISE OFF THE GROUND (R. O. G.)—A model airplane of the R. O. G. type has landing gear that permits it to take off from the ground or floor from a standstill under its own power. The landing gear must be strong enough to support the model while taking off and landing, and its usefulness must be demonstrated by gliding the model from a height of at least four feet, landing without damage and without nosing over. The wheels shall turn freely and be of such size as to permit the model to taxi readily on an ordinary platform. The minimum diameter of the wheels shall be not less than ¾ inch for models whose wing area is less than 65 square inches;

1 inch for models whose wing area is between 65 and 125 square inches;

1¼ inch for models with wing area between 125 and 150 square inches;

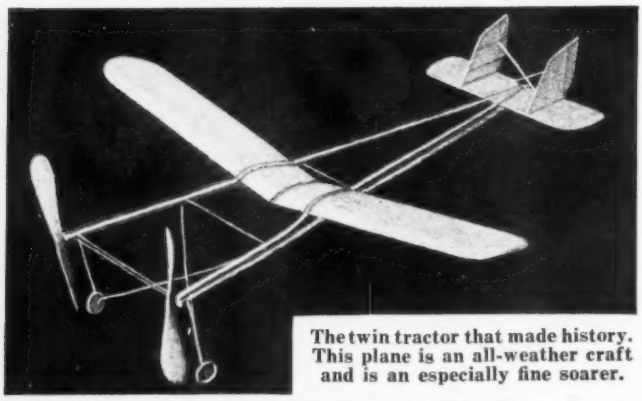
1½ inch for models with wing area between 150 and 250 square inches;

2 inches for models with wing area greater than 250 square inches.

HAND-LAUNCHED—A model airplane is hand-launched when it is released into flight directly from the hands of the launcher. The model shall be launched from an elevation of not more than six feet above the ground or floor.

FUSELAGE MODEL—A model airplane of the fuselage type has a built-up, enclosed fuselage. The minimum area of the maximum cross section of the fuselage must correspond to the formula $\frac{L^2}{100}$ where "L" equals the overall length of the model, excluding the propeller. The fuselage shall be of

(Continued on page 46)



The twin tractor that made history. This plane is an all-weather craft and is an especially fine soarer.

A Twin Tractor That Amazed Experts

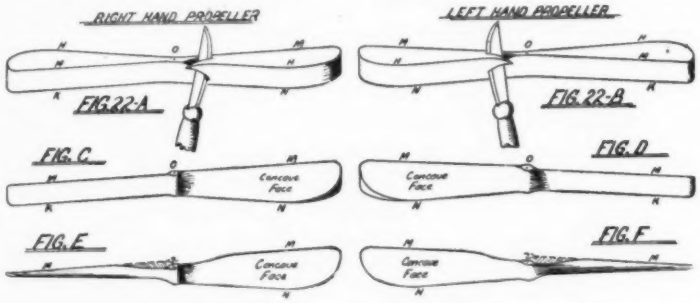
Here is a Record Breaker Fulfilling Contest Requirements that is a Consistent Flier and which has Never Crashed

By Charles H. Grant

Published through the courtesy of "The Open Road for Boys Magazine."

DUE to the stimulus afforded by model flying competitions, model builders have unceasingly struggled to improve the flying qualities of their models. However, one phase of model design, attention to which will give great improvement in flying qualities, has been sadly neglected. It is the *stability* of the model. The neglect has probably been due to the fact that few model builders realize that the lack of stability seriously reduces the power available for actual flight. This loss of power is due to the fact that a certain percentage of the power of the model is used in the effort of the model to recover its normal flight position when once it has been forced out of this position. Also, the wing is not operating efficiently unless it is horizontal and passing through the air at about four degrees angle of attack. You all know that balance is recovered usually at the expense of altitude. This should give you a valuable hint.

With this thought in mind, I decided to design a machine with unusual stability, based on a principle that was not commonly used, yet in which I had great faith due to the results of numerous previous experiments.



The accuracy of this standpoint was verified by the performance of the plane. When entered in the eliminations at Springfield, Mass., for the 1931 National Contest, it set a world's record for twin tractors with 50 square inches of wing area to the ounce. It surpassed all other competitors in this class by a wide margin and placed third against models that were designed with 100 square inches to the ounce. Some of the most expert model builders were competing.

This ship was flown continuously for a period of a year or more without a single crash or bad landing. It literally wore itself out from overwork. Besides being a consistent flier, it has fine soaring qualities and has proven to be a plane that is especially qualified to reap full value from thermal currents.

There have been many requests for details of this plane so I have undertaken to present them for the benefit of UNIVERSAL MODEL AIRPLANE NEWS readers. Suppose I tell you how to build it.

Proceed carefully, following the instructions and plans exactly, and you will have as your reward a plane that will give long service and beautiful flights with every trial.

In Fig. No. 1 a plan view of the machine is given, showing how it should look when completed. It will give you a general idea of its construction before you start to make the various separate parts.

YOU start the construction by making all of the wire parts. Fig. No. 2 shows the (S) or motor shackle hook used at (T) Fig. No. 1. Make two of these from 1/32" hard steel wire, *exactly* as shaped in the diagram. Fig. No. 3 shows the motor hook. Make this also of 1/32" wire to the exact shape given in the diagram.

Make two propeller shafts as shown in Fig. No. 4, of 1/32" wire. Also one Frame Brace motor support of 1/32" wire (steel) as in Fig. No. 5. At A and A' the diagram shows you how this part fits over the two frame stringers. BE SURE TO MAKE ALL WIRE PARTS THE *EXACT* SIZE AND SHAPE AS GIVEN IN THE DIAGRAMS.

Fig. No. 6 shows how the chassis or landing gear is made. Follow the dimensions given *very* carefully. This is made of 41/1000 (0.041) wire (steel). The bends at (R) and (U) are right angle bends. Also at (M) and (N). At (K) and (K') the ends of the wire are looped around as shown. Through these loops the axle passes when you finally assemble the machine. This loop should NOT be more than 1/16" in diameter.

The chassis cross braces are shown in Fig. No. 7. Make this part 1/32" hard wire and bend it to the shape and dimensions shown, ignoring the dotted lines at (S') for the present. Make the axles (G-S and H-S) straight as shown at (S).

Fig. No. 10 shows how to make the propeller bearings. There are two of them which are made of 1/8" diameter aluminum tubing flattened out and bent in a right angle at the center. A 1/32" hole is drilled in one end of each bearing.

You are now ready to construct the frame, as shown in Fig. No. 8. The two frame stringers (B-T) and (B'-T) are to be made of hard or medium hard balsa. They are 36" long by 1/4" square from *(Continued on page 44)*

FIG. 2 → 8

FIG. 1

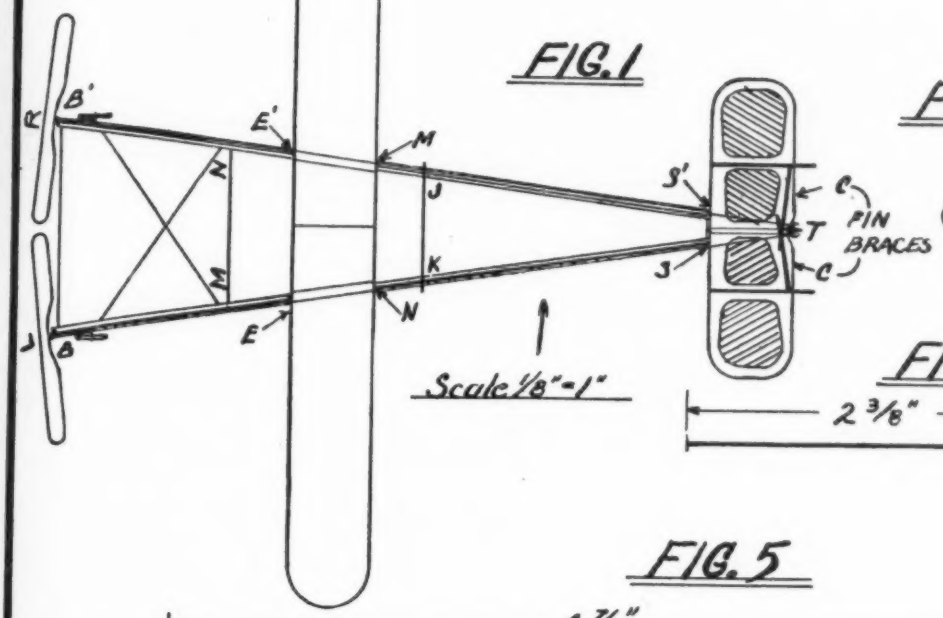


FIG. 3

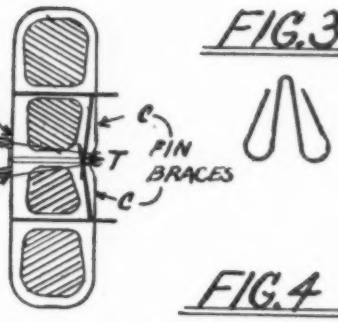


FIG. 4

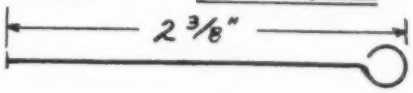
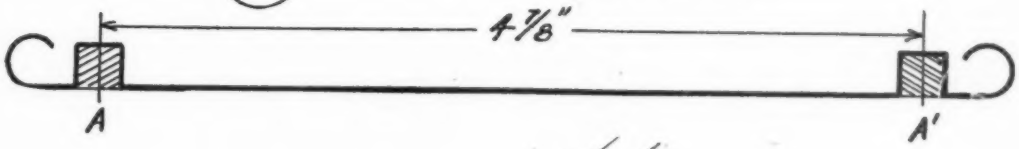


FIG. 5



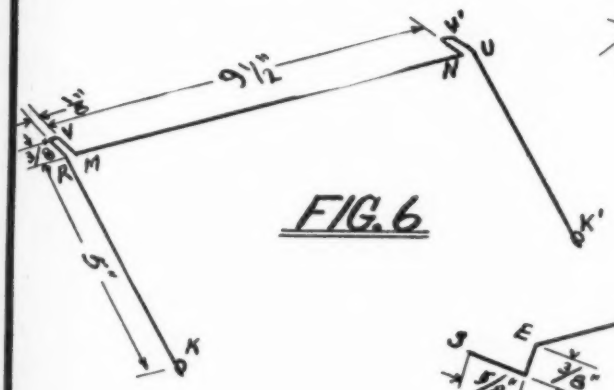


FIG. 6

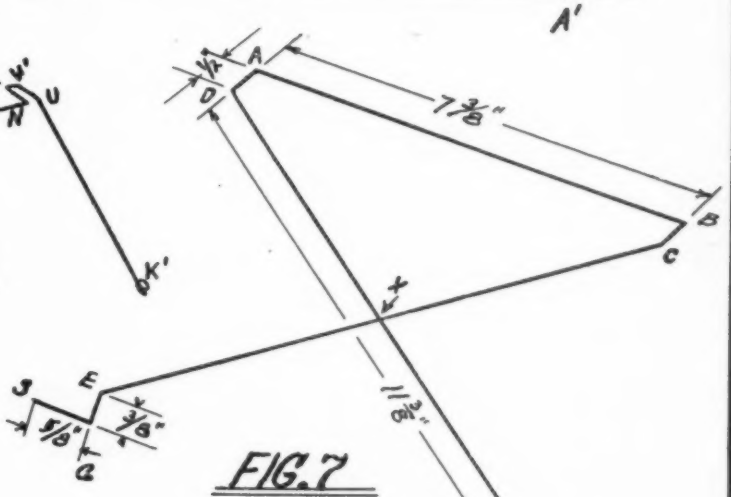


FIG. 7

AB = Aluminum tube 1/16" inside Dia. 1/64" wall. 1" long
CB = Tube flattened
DB = Bearing bent as shown.

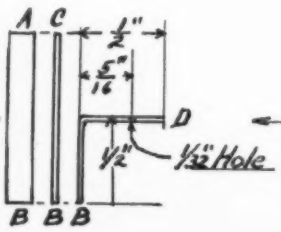


FIG. 10

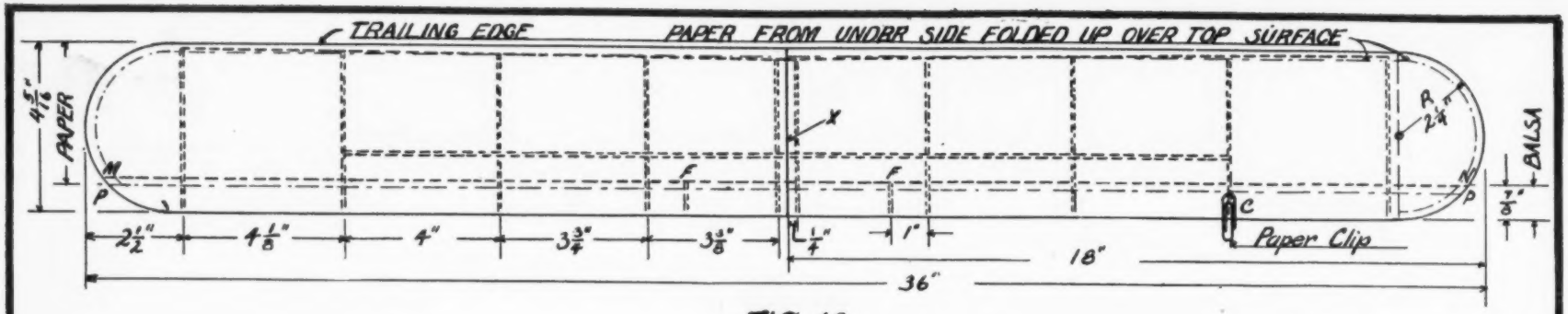


FIG. 12

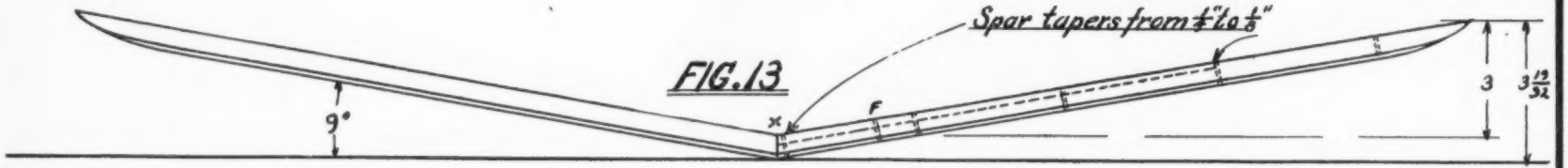


FIG. 13

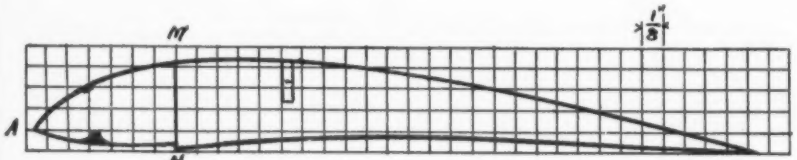


FIG. 14

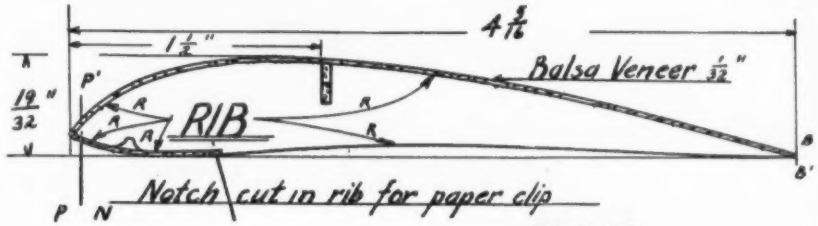


FIG. 15

FIG. 17

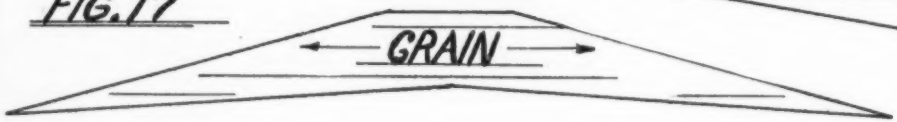
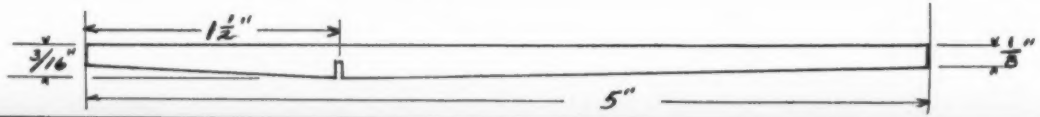
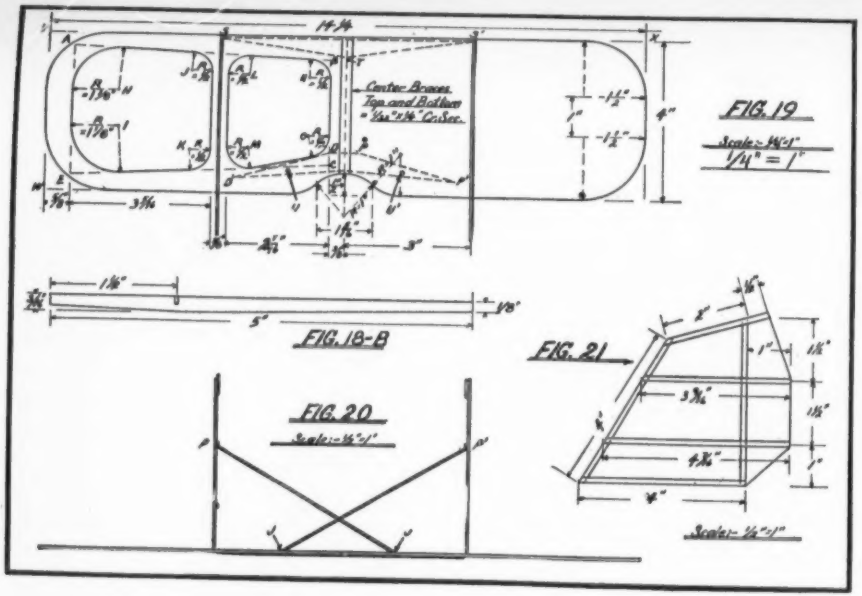


FIG. 16

FIG. 18-A




Center Braces
Top and Bottom
= 1/32" x 1/4" Cz Sec.
FIG. 19
Scale:- 1/4"=1"
1/4" = 1"
FIG. 18-B
FIG. 20
Scale:- 1/2"=1"
FIG. 21
Scale:- 1/2"=1"

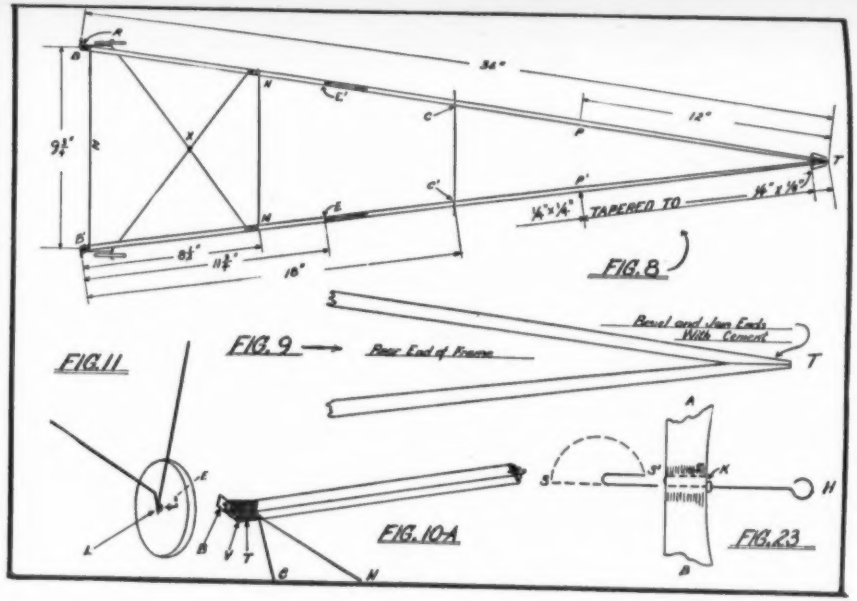


FIG. 8
TAPERED TO
FIG. 9
Rear End of Frame
Bevel and Join Ends
With Cement
FIG. 11
FIG. 10-A
FIG. 23

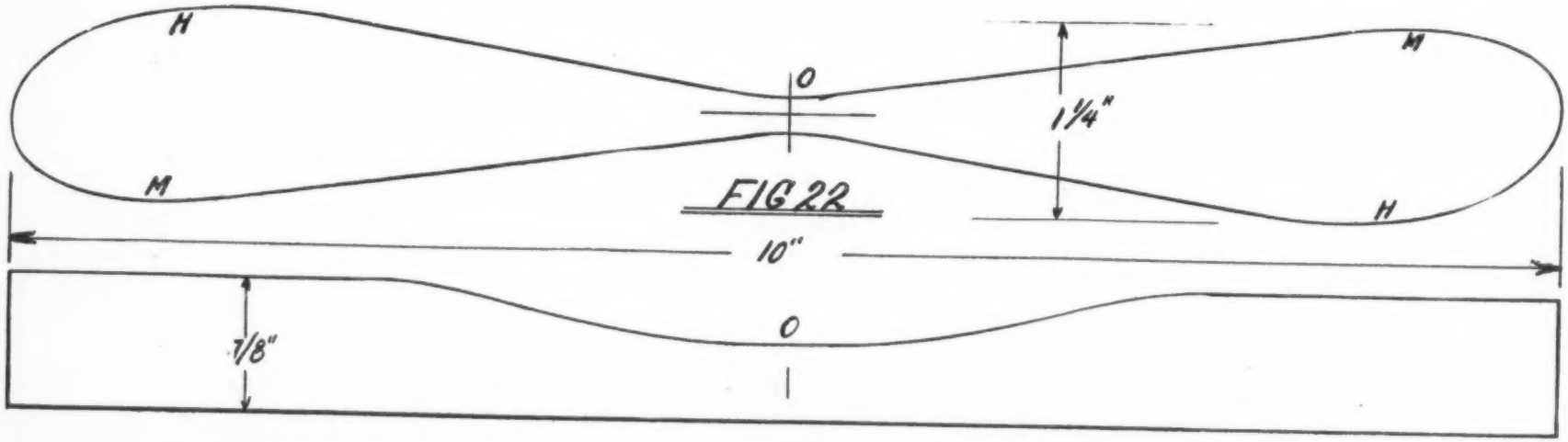
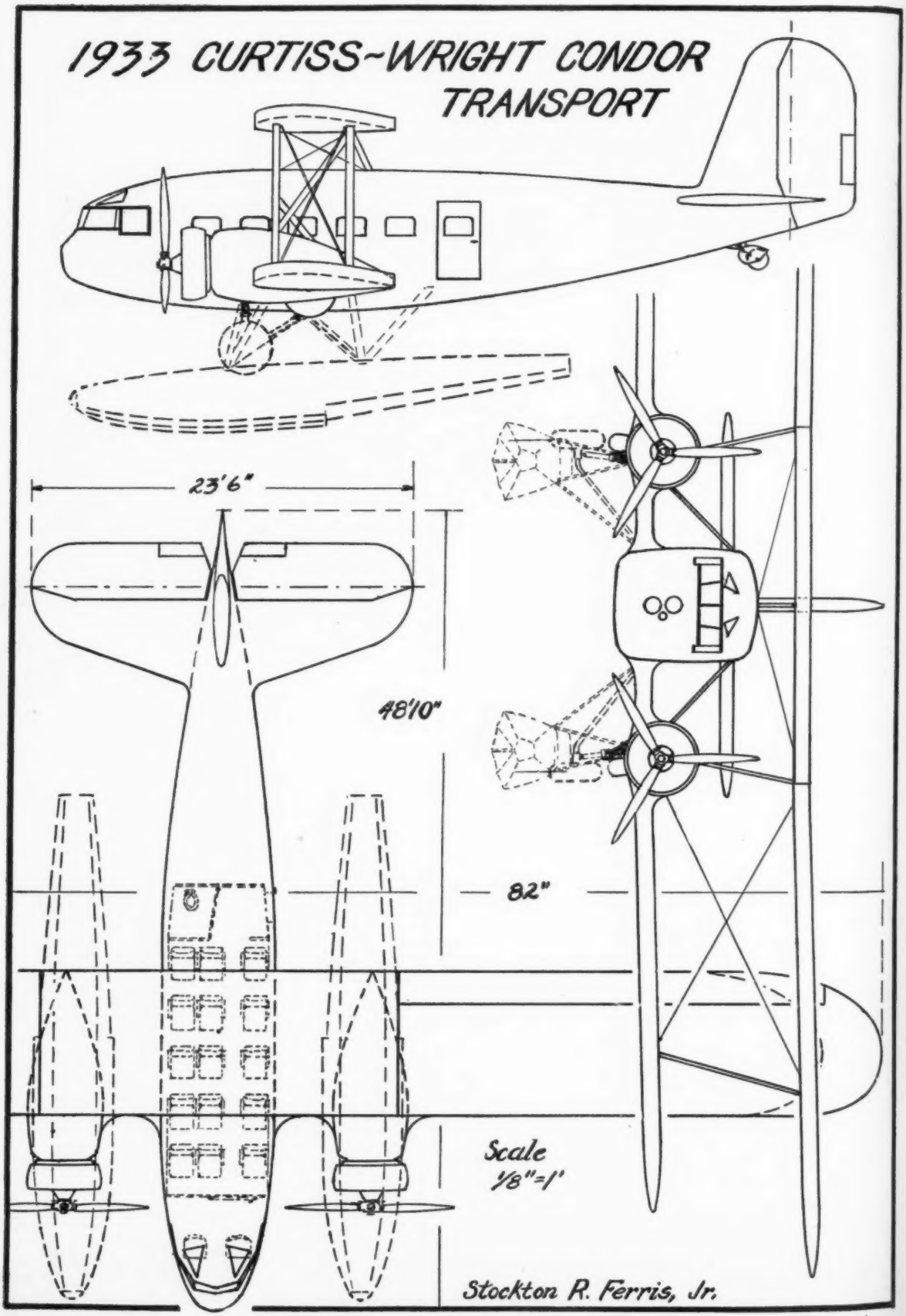


FIG 22
1 1/4"
10"
7/8"


1933 CURTISS-WRIGHT CONDOR
TRANSPORT
23'6"
48'10"
82"
Scale
1/8"=1'
Stockton R. Ferris, Jr.

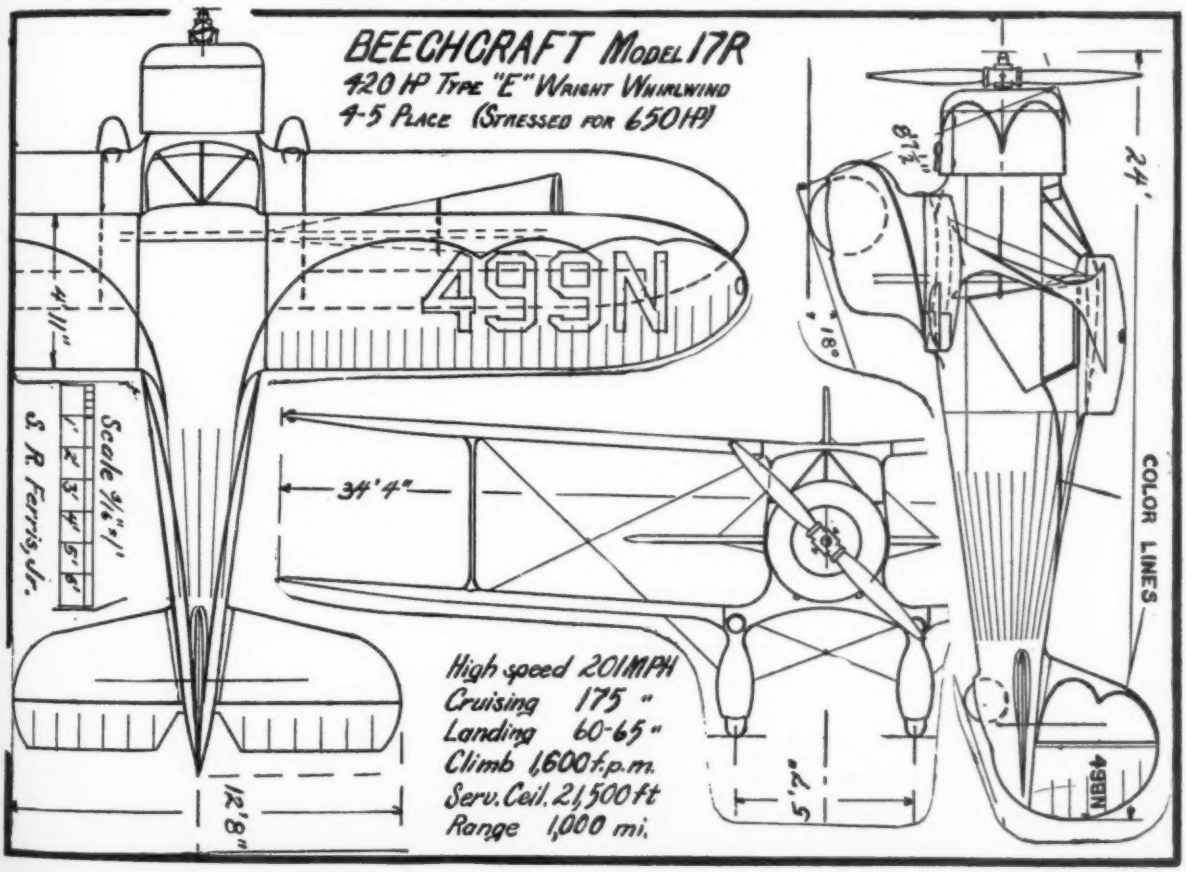
The New Curtiss-Wright Condor

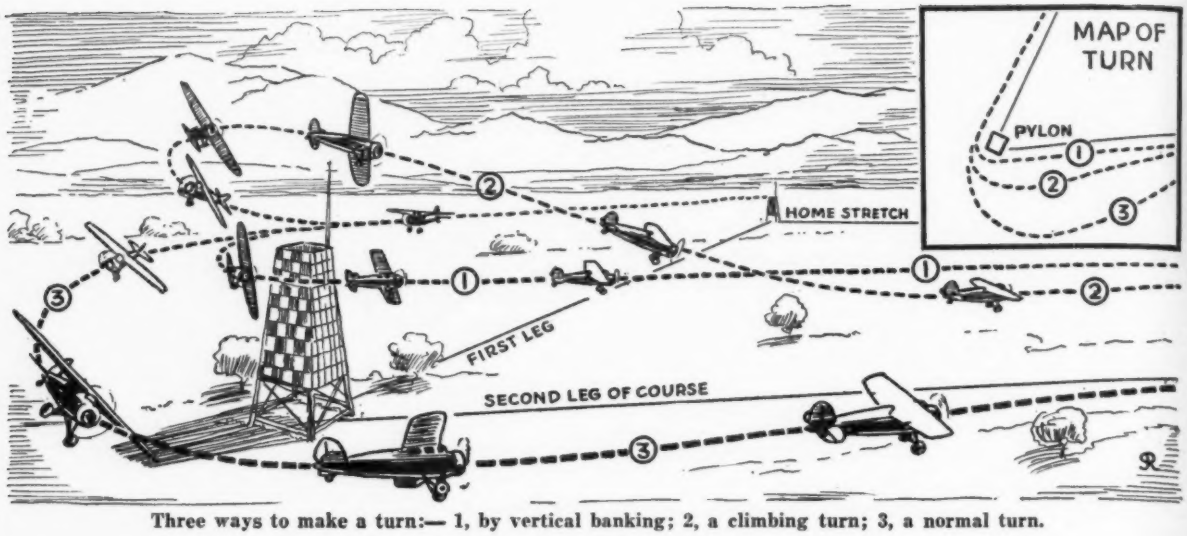
THIS new and efficient transport has been put into service recently on several of the important air lines. Though it has only an 81-foot wing span, compared to the 91 feet, 9 inches span of the old type Condor, it is faster by thirty miles per hour, with a top speed of 170 m.p.h. It also carries fifteen passengers, two pilots, 450 pounds of baggage and 200 pounds of mail. These besides the additional features.

It is equipped with two 700 h.p. Wright Cyclone engines weighing only 1.22 pounds per horse power. Every precaution has been taken to insure passenger comfort. The propellers are geared down to reduce noise.

This ship has a service ceiling of 17,500 feet and can climb to 3000 feet with full load on one engine. The flying range is 560 miles.

The frame of the fuselage is built up of welded steel tubing. The wings are all metal with dural ribs spaced 10 inches apart. The whole ship is fabric covered.





Three ways to make a turn:— 1, by vertical banking; 2, a climbing turn; 3, a normal turn.

Airplane Maneuver Contest

What Maneuver is Being Executed by the Plane on the Cover?

Winner of March Contest

Do you wish to become a pilot? If you do, you will want to know how and why a plane is made to perform the maneuver pictured on the cover. Enter this contest and learn the basic principles of flight. The winner of each monthly contest will receive, as a prize, the beautifully colored, original painting of the cover picture. $100.00 in prizes given to winners of the contest of six monthly cover pictures, February to July.

SOME of our worthy readers may not have been able to enter this contest when it started in February. However, do not let this fact discourage you, for the winner of each separate monthly maneuver problem is awarded the original painting of the cover picture for the particular month of which he is winner. Also do not be disappointed if you have sent in answers to the first three cover pictures and have not placed well up toward the head of the list of winners and runners-up, for your answers given for the problems to come may raise your average for the six covers to such an extent that you will ultimately place among the winners. Remember, there are nineteen prizes, not including the cover pictures.

The Winner for March

HERE is another winner that receives a beautiful painting of one of our cover pictures to hang in his den, bedroom or shop. This is the part of our story that makes the old heart go pit-a-pat. It is hard probably to wait for two months to know whether or not you have been a winner, but it is impossible to let you know sooner for there have been hundreds of answers to each picture, which we have had to go over very carefully. Also, it takes two months from the time the copy for the magazine is prepared, until it reaches your hands.

Well, we will not keep you in suspense. We take great pleasure in announcing that the March winner is W. O. Watkins of Tucson, Arizona, P. O. Box 207. Accept our congratulations. The painting of the cover picture will be mailed to you. In fact you may have it hanging in your den by the time you read this.

There were many other very excellent answers which we had to consider carefully before the winner could be chosen. Those who placed well up toward the front are:

Gordon Holbrook, Maplewood, New Jersey.

Don Alexander, Cincinnati, Ohio.

(Cont'd on page 42)

Position of controls during turn.

Here is How You Win the Awards

EXAMINE the cover picture carefully and determine what maneuver the plane is executing. This can be done by noting the position and attitude of the plane and the setting of the ailerons, rudder and elevators. When you think you can give the correct answer, write us, naming the maneuver and how it is performed. Also give your name and address, printed or typewritten. The last maneuver in this contest will appear on the cover of the July UNIVERSAL MODEL AIRPLANE NEWS.

Winners will be chosen on the basis of accuracy, neatness and the amount of detailed information given about each maneuver. The awards will be as follows:

Winner of 1st place, $25.00; 2nd place, $15.00; 3rd place, $10.00; 4th to 7th places, inclusive, $5.00; 8th to 19th places, inclusive, $2.50.

All answers to any particular pictures must reach this office by the 20th of the current month.

The correct answer for any particular cover will appear in the following issue of this magazine, with diagrams explaining the maneuver.

Send answers to **Maneuver Contest,** UNIVERSAL MODEL AIRPLANE NEWS, 125 West 45th Street, New York City.

FRONT PAGE NEWS

AN IMPORTANT, NEW LOW-PRICE CREATION

Offered Exclusively by Selley

DEALERS WANTED

KNIFE-CUT BALSA *only*

PERFECT WOOD!

100% better than saw-cut sticks!

AT LAST! The model builder's dream realized! *Selley* scores the greatest beat in history! The first and only improvement in balsa wood production! After two years experimenting, *Selley* has created and perfected a semi-automatic machine that produces fine selected white balsa strips of INCREASED STRENGTH, PERFECTLY STRAIGHT, ABSOLUTELY ACCURATE TO SIZE, AND GLASS SMOOTH ON ALL FOUR SIDES!

Only due to the tremendous production, with no waste, can we offer these NEW LOW PRICES, passing the SAVINGS on to you!

Compare this wood with saw cut balsa. Saw-teeth tear the fibres, weaken the strength and produce uneven, inaccurate-sized sticks.

Our new knife compresses the fibres and actually increases the strength of the wood. SELLEY ALONE can supply you with any stick from 1/64" sq. to 3/16" sq., perfectly straight, uniform and accurate to size! Order now and stock in on all sizes!

Minimum postage charge 15c.

READ THIS FOR YOUR PROTECTION

Every SELLEY product is guaranteed to be the best obtainable and is manufactured in the largest and most modern factory in the world. You may safely choose any construction set or accessory and if it does not meet with your entire satisfaction your money will be immediately refunded!

SELLEY ALONE CAN MAKE THIS BROAD GUARANTEE!

THESE 14" FLYING KIT VALUES *are going over* BIG!

No wonder! These kits are accurately designed, realistic flying scale models embracing the same quality that thousands of boys enjoyed in SELLEY'S much higher priced kits. Remember this! NOTHING IS CHANGED BUT THE PRICE AND THE PRICE IS THE LOWEST IN OUR HISTORY! Pick your favorites and send in your order today!

COMPLETE **25¢** each

POSTAGE
10c *for every two kits*
20c *for four kits*
30c *for six kits*
West of Miss., 15c

Space prohibits illustrating all six models:
HEATH PARASOL — FAIRCHILD
BUHL BULL-PUP — VERVILLE AIR COACH
AERONCA — CURTISS NAVY RACER

NEW! BUILD AND FLY *Selley's Models*

Gee-Bee Super-Sportster

THESE 18" FLYING KIT WONDERS *are winning nation-wide* POPULARITY!

Every model is packed in a separate box, labeled and sealed and comes complete with full-size 3-view plan, layout sheet with all details clearly shown, SPECIAL MACHINE-TURNED BALSA COWLS, PROP, HUB, WHEELS. Printed balsa rib and bulkhead sheet, colored tissue, cement, music wire, rubber, reed, bamboo, printed motor dashboard, insignia sheet and best-grade balsa sized sticks. What a value! Select yours NOW!

95¢ each — *Postage 15c West of Miss. 25c*

Plans Alone 25c each

Space prohibits illustrating all four models:
A-8 ATTACK — BOEING
WEDELL WILLIAMS
GEE-BEE SPORTSTER

Curtiss A-8 Attack

LATA BALSA SPRAYS
18" lengths

1/32"	x 1/64"	80	for 5c
1/32"	x 1/32"	40	for 5c
1/32"	x 1/16"	40	for 5c
1/32"	x 3/32"	40	for 5c
1/16"	x 1/16"	46	for 5c
1/16"	x 3/32"	46	for 5c
1/16"	x 1/8"	46	for 5c
3/32"	x 3/32"	30	for 5c
3/32"	x 1/8"	30	for 5c
1/8"	x 1/8"	24	for 5c
1/8"	x 3/16"	24	for 5c
1/8"	x 1/4"	12	for 5c
3/16"	x 3/16"	16	for 5c
1/4"	x 1/4"	12	for 6c
1/4"	x 3/8"	8	for 5c
3/8"	x 3/8"	8	for 5c
3/8"	x 1/2"	6	for 6c
1/2"	x 1/2"	4	for 7c

LATA BALSA SHEETS
18" lengths

1/64"	x 2"	15c	for 10
1/64"	x 3"	30c	for 10
1/32"	x 2"	15c	for 10
1/32"	x 3"	5c	each
1/32"	x 6"	12c	each
1/16"	x 2"	7c	for 4
1/16"	x 3"	5c	each
1/16"	x 6"	12c	each
3/32"	x 2"	2c	each
3/32"	x 3"	5c	each
3/32"	x 6"	12c	each
1/8"	x 2"	2c	each
1/8"	x 3"	5c	each
1/8"	x 6"	12c	each
3/16"	x 2"	5c	for 2
3/16"	x 3"	5c	each
3/16"	x 6"	12c	each
1/4"	x 2"	3c	each
1/4"	x 3"	6c	each
1/4"	x 6"	15c	each
1/2"	x 2"	5c	each
1/2"	x 3"	9c	each
1/2"	x 6"	18c	each

LATA BALSA LOGS
36" lengths

1"	x 1"	10c each
1"	x 2"	17c each
1"	x 3"	25c each
1"	x 6"	50c each
1½"	x 1½"	23c each
2"	x 2"	34c each
2"	x 3"	50c each
2"	x 4"	68c each
2"	x 6"	$1.00 each
3"	x 3"	75c each
3"	x 6"	$1.50 each

Postage 10c Per Log

Balsa Propeller Blocks

3/8"	x 1/2"	x 3"	4 for 5c
1/2"	x 3/4"	x 6"	3 for 5c
5/8"	x 1"	x 7"	2 for 5c
5/8"	x 1"	x 8"	2 for 6c
7/8"	x 1½"	x 9"	4c each
1"	x 1½"	x 10"	5c each
1"	x 1¼"	x 12"	8c each

Now-Selley Wheels Cost Less!

The largest and lowest-priced selection in the world

Aluminum Disc Rubber Tired Air Wheels		Celluloid Untired	
1"	dia...16c pr.	¾"	dia... 6c pr.
1¼"	dia...20c pr.	1"	dia... 8c pr.
1½"	dia...25c pr.	1¼"	dia...10c pr.
Treaded Rubber Aluminum Disc		1½"	dia...16c pr.
1 3/16"	dia.30c pr.	3"	dia...40c pr.
1⅝"	dia...40c pr.	**Celluloid Pants**	
2"	dia...50c pr.	¾" or 1"	Whl. 25c pr.
3"	dia...85c pr.	1¼" or 1½"	Whl. 30c pr.
5⅛"	dia. $1.25 pr.	**Celluloid Air Wheels**	
Balsa Wheels Balloon Tire Shape		¾"	dia... 8c pr.
½"	..... 5c pr.	1"	dia...10c pr.
⅝"	..... 6c pr.	**Bal. Tired Col. Disc Whl.**	
1"	..... 7c pr.	1¼"	dia...30c pr.
1¼"	..... 8c pr.	1½"	dia...35c pr.
1⅝"	.....15c pr.	2"	dia...45c pr.

Postage on Rubber Tired Wheels 4c; Untired, 3c pr.

Send for Airplane catalogue.

The Lowest Prices Ever Offered on *Selley's* Model Supplies!

PROPELLERS

CAST METAL

PROPELLERS—CAST METAL

2 BLADED		3 BLADED		2 BLADED		3 BLADED	
3¼"	.25			3¼"	.20		
4"	.30	4"	.35	4"	.25	4"	.30
4½"	.35	4½"	.45	4½"	.25	4½"	.40
5"	.35	5"	.50	5"	.30	5"	.45
5⅝"	.40	5⅝"	.60	5½"	.35	6"	.60
6¼"	.40	6¼"	.70	6"	.40		
7"	.55	7"	.80	6¼"	.45	7"	.70
8"	.65	8"	.90	6¾"	.50	8"	.80
9"	.75	9"	1.00	8"	.60	9"	.90
10"	.85	10"	1.10	9"	.70	10"	1.00
11"	.95	11"	1.25	10"	.80		
12"	1.10	12"	1.50	12"	1.00	12"	1.25

The following sizes are supplied with adjustable blades with special hub, clamping rings and safety screws.

15"	$6.00	15"	7.00	15"	$5.00	15"	$6.00
18"	7.00	18"	8.00	18"	6.00	18"	7.00
21"	8.00	21"	9.00	21"	6.50	21"	8.00
25"	8.50	24"	10.00	24"	7.00	24"	8.50

Packing and Postage 3c each up to 6" dia., 6c each up to 12" dia., 12c each up to 24".

Spun Aluminum Cowls

Diameter	Anti-Drag	Open Cowl	Closed Cowl
1⅝"	.20	.20	.20
2"	.25	.25	.25
2⅛"	.28	.30	.30
3"	.30	.35	.35
3⅛"	.40	.45	.45
4"	.50	.55	.55
4½"	.75	.80	.75
5"	.90	.95	.90
5⅛"	1.05	1.10	1.05
6"	1.25	1.30	1.25
7"	1.50	1.60	1.50
8"	2.00	3.25	2.00
9"	2.50	2.75	2.50
10"	3.00	3.25	3.00

Packing and Postage 6c each on sizes up to 4" diameter. 10% of price of cowl on larger sizes.

Send 5c for Boat Catalogue.

SELLEY MANUFACTURING COMPANY

1373A GATES AVE., BROOKLYN, NEW YORK

Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U. S. Army

AS I survey the number of questions that have arrived this month to be answered, I cannot help but be impressed by the growing interest in model aviation. I hardly know where to begin, so picking up one of the letters at random, I find the name of Robert W. Gaines signed at the end of it. Gaines lives at 503 West High Street, Urbana, Illinois. As I look over his letter, I find that there are a number of interesting questions. Here they are:

Question: What is the most efficient aspect ratio of model planes as regards the wings?

Answer: The most efficient aspect ratio depends upon the type of machine you are building. If it is a contest machine, I would suggest an aspect ratio of about 8 to 9. If it is a fuselage model, an aspect ratio of 6 or 7 is sufficient if the wing structure can be made very light and strong and if it does not have to support very much wing at the center of the span.

Question: What wing loading will give the best results?

Answer: The wing loading given to any plane is determined upon the use to which you wish to put this plane. If it is an indoor ship, the wing loading may be made as low as 0.25 of one ounce for every square foot of surface. For outdoor ships, the lowest wing loading should be one ounce to every 100 square inches. A very efficient wing loading for outdoor ships is one ounce to every 80 square inches. Rough weather ships should be designed one ounce to every 50 square inches.

Question: What angle of attack is most satisfactory?

Answer: From the phrasing of the question, it seems that you mean angle of incidence, not angle of attack. However, we will tell you something about both of them. The most efficient angle of attack is usually about 4 or 5 degrees. The most efficient angle of incidence, that is, the angle at which the wing is placed upon the machine relative to the line of thrust, is about 2 to 3 degrees.

Question: How does one compute propeller blade area?

The answer to this question is too complicated to give in this column. I suggest that you read the articles appearing in the May to October, 1932, issues of our magazine, entitled, "The Aerodynamic Design of the Model Plane." These articles will answer your question in complete detail.

Question: How does one determine the center of lift on wings?

Answer: The center of lift is usually determined in the wind tunnel, through experiment. Charts showing the center of pressure position at any angle of attack, for any airfoil section, may be secured from the Advisory Committee for Aeronautics, Washington, D. C. The center of lift for normal flying angles is taken usually as located at a point one-third of the chord from the front edge of the wing.

Question: How does one determine what pitch of propeller to use?

Answer: The average propeller pitch is one and one-half times the diameter of the propeller, on model planes. For contest models, the pitch may be made 1.7 to 1.9 times the diameter of the propeller.

Question: What is fineness of streamline?

Answer: Fineness of streamline is the width of the streamline body at its maximum point, divided by its length.

Question: How does one offset propeller torque?

Answer: Propeller torque may be offset by means of the rudder. I believe this to be the most efficient way. It is also possible, however, to give the wing greater angle of incidence on one side, that is, the side which has a tendency to drop. Propeller torque may be reduced to a minimum by giving a large amount of area to the propeller blades: for instance, 1/15th the wing area.

We hope Gaines finds these answers satisfactory.

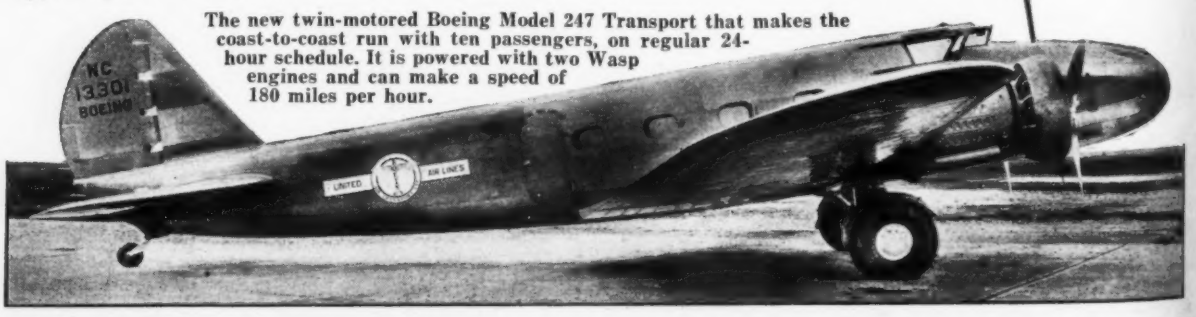
BERT D. BLAIR writes in to us from Red Deer Hill, Saskatchewan, Canada. He asks us:

Question: Who flew the Gee Bee NR 2100?

Answer: James Doolittle at the Cleveland Air Races.

Question: What is an airfoil?

Answer: An airfoil is any surface which gains its sustaining qualities by passing through the air.



The new twin-motored Boeing Model 247 Transport that makes the coast-to-coast run with ten passengers, on regular 24-hour schedule. It is powered with two Wasp engines and can make a speed of 180 miles per hour.

Question: What is the slip stream?

Answer: The slip stream is the column of moving air which has been driven backward by the propeller and which moves faster than the surrounding air because of the impulse derived from the propeller.

Question: What is drift?

Answer: Drift is the lateral or sideways directional movement relative to the earth's surface, due to a side wind.

Question: What is sweepback?

Answer: Sweepback is a term applied to a wing when its lateral axis slants backward from the center, toward each wing tip. Usually the lateral axis of the wing is straight from tip to tip. Sweepback is usually employed in tailless airplanes.

Question: How much sweepback do you think should be given to a tailless monoplane?

Answer: Each wing should be swept back about 20 degrees. This value is dependent upon the design of the ship. Some planes might require as much as a thirty-degree sweepback.

JACK JOY of 23 Lakewood Avenue, Buffalo, New York, asks us:

Question: What is the best way to make pants for a solid model?

Answer: I might suggest the best way to get this information would be through an airplane tailor. However, we will endeavor to answer it here. Form the pants of two pieces of wood, each piece to be one-half a pant. Shape the pant out of these two pieces, while they are held together with pins or brads. When the outside has been correctly shaped, take the two halves apart and scoop out enough of the wood from each half pant to allow the wheel to be fitted in place. Glue the two halves together when you are sure that the wheel may be inserted inside the pant and yet have it turn freely. The axle may be formed by a small brad pin or wire, driven through the wheel from one side of the pant to the other side, in the proper place.

We have a letter from Reeds Spring, Mo., signed Estel Davis, who asks us:

Question: Will a plane go past the vertical into the attitude of an outside loop or will it continue in a dive if the stick is held forward indefinitely?

Answer: The action of the plane when the controls are operated in this way depend upon the ship itself and upon the speed with which the stick is pushed forward. Usually you will find that the plane will nose over sharply and turn over on its back, flying along horizontally upside down. However, if the stick is pushed forward and kept there too long a time, the ship, while it is flying upside down, will stall in this position. This will result in a dive. After the ship has again attained sufficient speed, it will go into the upside down position again provided the stick is held forward. In order to keep flying on its back, the stick should be pulled slightly backward, the amount depending upon the particular machine which you are flying.

Well, friends, the sun is dropping down behind the skyscrapers to the west of my office window and I am afraid that it will be necessary for me to leave you for another month. However, if you have any puzzling questions, send them to us and we will do our best to give you satisfactory answers.

GUARANTEED TO FLY

STAR★FLYERS

BEWARE! Don't confuse these Kits with ordinary kits now being offered by other firms for 25c. Star Kits are actually worth $1.00 and more.

CAUTION! After considerable experimenting we have found that flying models must have a wingspan of at least 15" to assure ease of construction and good flights. Star Kits conform with this requirement.

2 OR MORE KITS SENT POSTPAID

25c EACH

PLUS 5c POSTAGE

EVERY KIT CONTAINS
Ready-made propeller, drilled for shaft.
Ready-made wheels, drilled for axle.
Ready-made nose plug, drilled for shaft.
Ready-made wire fittings.
Ready split bamboo.
All balsa strips cut to size.
All ribs, bulkheads, fairings, etc., printed on balsa.
2 sheets colored tissue.
Bottle cement.
Bottle banana oil.
Washers.
Rubber motor.
Full-size plans; complete instructions.

★★★ 15-INCH WINGSPREAD ★★★

DEALERS! WRITE FOR SPECIAL DISCOUNTS IN KITS!

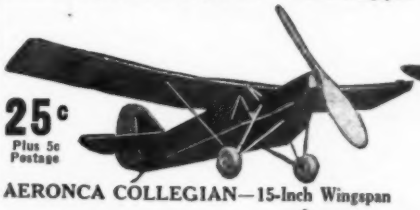
Plans Only 10c 3 for 25c Postpaid

25c Plus 5c Postage

BELLANCA SKYROCKET—15-Inch Wingspan

25c Plus 5c Postage

WACO MODEL C—15-Inch Wingspan

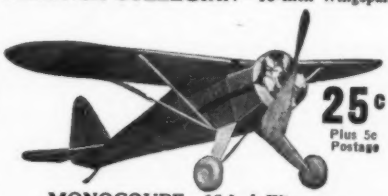


25c Plus 5c Postage

AERONCA COLLEGIAN—15-Inch Wingspan

25c Plus 5c Postage

PUSS MOTH—15-Inch Wingspan



25c Plus 5c Postage

MONOCOUPE—15-Inch Wingspan

25c Plus 5c Postage

FOKKER D VII—15-Inch Wingspan

FREE WINDER GIVEN with every purchase of $1.50 or over, including kits. Value 50c. SEND NOW.

18" Balsa Strips
1/16 x 1/16, 30 for 5c
1/16 x 3/32, 25 for 5c
1/16 x 1/8, 25 for 5c
5/32 x 3/32, 25 for 5c
1/16 x 1/4, 25 for 7c
1/8 x 1/8, 25 for 5c
1/8 x 3/16, 25 for 9c
1/8 x 1/4, 25 for 12c
3/16 x 3/16, 12 for 6c
3/16 x 1/4, 12 for 7c
3/16 x 5/16, 12 for 9c
1/4 x 1/4, 12 for 9c
1/4 x 3/8, 6 for 7c
1/4 x 1/2, 6 for 8c
3/8 x 3/8, 6 for 8c
3/8 x 1/2, 6 for 9c
1/2 x 1/2, 4 for 9c
1 x 1, 2 for 15c

18" Sheet Balsa
1/64 x 2.....5 for 7c
1/32 x 2.....5 for 7c
1/16 x 2.....5 for 8c
3/32 x 2.....5 for 9c
1/8 x 2.....5 for 10c
3/16 x 2.....3 for 10c
1/4 x 2.....3 for 13c

Prop Blocks
½ x ⅝ x 5, 5 for 3c
½ x ¾ x 5, 6 for 5c
⅝ x ¾ x 6, 6 for 5c
⅝ x 1 x 7, 6 for 7c
⅝ x 1 x 8, 3 for 5c
⅝ x 1½ x 9, 3 for 5c
⅝ x 1½ x 10, 2 for 5c
⅝ x 1½ x 11, 1 for 4c
⅝ x 1½ x 12, 1 for 5c
⅞ x 1⅝ x 16, 1 for 9c

18" Plank Balsa
1 x 2 ..... 12c
1 x 3 ..... 15c
1 x 6 ..... 20c
2 x 2 ..... 22c
2 x 3 ..... 25c
2 x 6 ..... 40c

Washers
Large or small
Two doz. 3c

Bushings—doz. 4c

Music Spring Wire
.014", .020", .025", .034": 18 ft. 5c

Colored Dope
Orange, red, green, silver, yellow, blue, black and white.
1 oz. 5c, 2 oz. 9c, pt. 40c

Colorlesa Cement
1 oz. 6c, 2 oz. 10c
4 oz. bottle 18c

Reed
1/32", 1/16", 3/32", 1/8": ..... 6 ft. 3c

Bamboo
1/16 x 1/4 x 12" ... doz. 6c
1/16 x 1/4 x 15" ... doz. 7c
1/16 x 1/16 x 10" ... 2 doz. 5c

Alum. Tubing
1/16" O.D., per ft. 5c
1/8" O.D., per ft. 6c
3/16" O.D., per ft. 8c

Sheet Alum.—12" Wide
.002".....per ft. 12c
.005".....per ft. 11c
.010".....per ft. 13c

Celluloid Wheels
In all colors
¾" diam., per pr. 4c
1" diam., per pr. 6c
1⅛" diam., per pr. 8c
1¼" diam., per pr. 12c
3" diam., per pr. 25c
1¾" Celluloid Pants —pr. 14c
3" Celluloid Pants —pr. 25c
2¼" Celluloid Cowlings —ea. 20c

Dummy Motors
1½" diam., each 16c
2" diam., each 22c
3" diam., each 29c

Banana Oil
2 oz. 7c, pt. 50c

Alum. Cowls and Rings

Diam.	Anti-Drag	Open Cowl	Closed Cowl
1½"	15c	15c	15c
2"	17c	17c	17c
2½"	22c	23c	23c
3"	25c	26c	26c
3½"	29c	30c	30c
4"	33c	35c	35c

Acetone
2 oz. 6c, pt. 40c

Camel Hair Brushes
Each 5c

Hardwood Wheels
1" diam.. 2 pair, 5c
Any color or plain.

Propeller Shafts or Rear Hooks
4 for 5c

Aluminum Wheels
1" diam., per pr. 10c
1½" diam., per pr. 15c

Para Rubber
1/16" sq. 50 ft. 12c.
225 ft. skein 50c
1/16" sq. 50 ft. 12c.
225 ft. skein 50c
3/32" sq. 50 ft. 13c.
225 ft. skein 55c
1/8" sq. 50 ft. 13c.
225 ft. skein 55c
3/16" sq. 50 ft. 16c.
225 ft. skein 70c

DOUBLE WINDERS Each 25c

Finished Balsawood Propellers
5" ..... each 5c

Finished Balsawood Pants per pr.
For ¾" wheels, . 14c
For 1" wheels, . 15c
For 1¼" wheels, . 17c
For 1½" wheels, . 22c

Thrust Bearings
Large and small
Each 1½c, doz. 15c

Rubber Air Wheels
1" diam., per pr. 13c
1¼" diam., per pr. 15c
1½" diam., per pr. 20c

Airplane Insignia
Stars in circle or bullseye.
1" diam., 8 for 5c
1½" diam., 7 for 5c
2½" diam., 6 for 5c

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Red, blue, green, white, orange, yellow purple. 3 sheets 5c.

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(At Right) HAWK'S SKY CHIEF

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371 Clinton Street Brooklyn, N. Y.

The Aerodynamic Design of the Model Plane

(*Continued from page* 15)

assumed in such cases that the wing has a normal amount of dihedral angle.

However, when the model is designed with the center section of the wing high, say one-half inch or more above the line of thrust, for every twelve inches of distance between the wing and stabilizer, then the negative setting of the stabilizer may be made less; about 1½ degrees negative instead of two degrees.

In other words, if $\frac{X}{M} = 1/24$ (see Fig. No. 65), then the stabilizer setting should be about (-1½) degrees less than the wing. The table following, gives the stabilizer setting for various distances that the wing is located above the line of thrust.

When $\frac{X}{M} = 0$, stabilizer setting=(2) degrees.

When $\frac{X}{M} = 1/24$, stabilizer setting=(-1½) degrees.

When $\frac{X}{M} = 1/12$, stabilizer setting=(-1) degree.

When $\frac{X}{M} = 1/8$, stabilizer setting=(-1/2) degree.

When $\frac{X}{M} = 1/6$, stabilizer setting=(0) degree.

When $\frac{X}{M} = 1/4$, stabilizer setting=(+1/2) degree.

When $\frac{X}{M} = 1/3$, stabilizer setting=(+1) degree.

When the center section of the wing is *below* the line of thrust, the distance from the line of thrust to the center section leading edge equals (-X).

When $\frac{-X}{M} = 1/24$, stabilizer setting=(-2½) degrees.

When $\frac{-X}{M} = 1/12$, stabilizer setting=(-3) degrees.

When $\frac{-X}{M} = 1/8$, stabilizer setting=(-3½) degrees.

IN order to be certain that the stabilizer, wing and line of thrust will have the proper angles and positions relative to one another, when the model is built, it is advisable to lay out a drawing of it carefully on your drafting board. Then the model should be built carefully to the measurements of the drawing. This is the secret of fine flying models. Guess work will not insure positive success. Perhaps you may guess right by building your model without a carefully made drawing but nine times out of ten, you will be wrong and good flights will be attained only through many trials with various arrangements of parts.

Stabilizer Moment Arm

We now come to the next factor by means of which we can secure stability. It is factor No. 2, the stabilizer moment arm. This is the distance between the center of the wing and the center of the stabilizer. See (M), Fig. No. 65.

The longer this moment arm relative to the wing span, the greater stabilizing effect a stabilizer of any given area will have. From a design standpoint alone it would be wise to have this moment arm infinitely long. However, it is obvious that such a condition would entail building an extremely long fuselage, upon the end of which the stabilizer would be mounted. Such a structure would be extremely heavy. This fact would reduce the flight of the plane enormously. Therefore it is required that the moment arm should be made such a length that it insures a sufficient amount of stability with as little weight in the fuselage as possible.

A good rule to follow that will usually fill all requirements is: *make the stabilizer moment arm equal in length to one-half the wing span.* In the case of models whose fuselage is merely one or two sticks, the moment arm can be made slightly longer than this without excessive fuselage weight, for instance, five-eighths the wing span. In heavy fuselage models, it may be made slightly less, say two-fifths the span. It is inadvisable to make it less than this unless the wing has a very high aspect ratio, that is, one of about ten. (Span equals ten times the chord.) Under these conditions the moment arm may be as short as one-third the span. However, for best results make it as long as possible if the fuselage or frame can be made light and strong at the same time. This can be accomplished often by using a tail boom. (*A light single stick extending rearward from the rear end of the fuselage, upon the end of which the tail surfaces are mounted.*)

EXPERIENCED model designers and fliers realize the importance of a long moment arm in securing steady flight. Many of the designers of large planes have never flown models and gained the individual and practical experience afforded by this means of experiment. They design planes from standardized data disseminated in the courses at aeronautical institutes, certain phases of which may be out of date by the time the student acquires it thoroughly. This is due to the fact that the aviation theory is still in the development period. It is advancing and changing rapidly. The philosophy taught is one of efficiency, not primarily safety. The latter is a secondary consideration. Per-

For Model Airplanes

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sonally, I believe this is one of the contributing causes of the delay of the general public in accepting the airplane as a universal means of travel. Commercialism seems to dominate the situation. The usual question is, how much pay load can the ship carry? When it should be, can this plane fly itself under all conditions without the guiding hand of the pilot? Will it refuse to stall and spin?

In one or two well-thought-of commercial ships, the stabilizer moment arm has been shortened to such an extent that the planes are critical, erratic and positively dangerous, even when flown by experienced pilots. In spite of several tragic accidents, these planes are considered to be well-designed and reasonably safe. Such opinions are the result of ignorance concerning what constitutes safe airplanes and the high degree of safety it is *possible* to build into them.

Experienced model builders have learned the trick of making airplanes stable and safe. Let us hope they will continue their work in this field so that they may inject some new practical ideas into airplane designing in the near future.

This short interlude is given with the hope that our readers will realize the scope and importance of experimentation with model planes as a means of solving aviation's problems.

The importance of a moment arm of sufficient length is only one-half the story, however, for the area of the stabilizer has a great bearing upon the longitudinal stability of a plane. In fact, it is the most important factor of all. Any model may be made stable if the horizontal tail surfaces are made with sufficient area.

One of the greatest faults of so-called scale models and even of full-sized airplanes, is that the horizontal tail surfaces are too small to insure steady flight and to overcome the tendency to stall. It has been a much-argued point as to how much area to give to the stabilizer. However, it is certain that the larger its area compared to the area of the supporting surfaces (wings), the less the plane will deviate from the normal flight path and the less the angle of attack of the wing will vary. Therefore, it is an obvious advantage to have large stabilizer area from this point of view.

It is also advantageous from an efficiency standpoint, for the less the magnitude of the variation of the attack angle of the wing, the greater is the average wing efficiency during the entire flight. Thus the plane will fly as well as an erratic plane, with less power required. Less power means fewer strands of rubber in the motor or motors, and fewer strands means a larger possible number of turns that can be stored in the motor.

MANY of the models today are being flown with stabilizers that are entirely too small. Yet builders of these machines wonder why they can obtain only an occasional perfect flight. In fact some model engineers do not know what a good flight really is. This especially applies to manufacturers of commercial construction kits. Some, however, through long experiment and by copying successful models, have developed some models of merit.

Perhaps some of my readers have built

(Continued on page 42)

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3/64" x 1/30"	.35
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10 ft.	1/16" x 1/30"
10 ft.	5/64" x 1/30"
10 ft.	3/32" x 1/30"
10 ft.	7/64" x 1/30"
10 ft.	9/64" x 1/30"
10 ft.	5/32" x 1/30"
10 ft.	11/64" x 1/30"
10 ft.	3/16" x 1/30"

$1 Assortment "B"

210 ft.	1/8" x 1/30"
21 ft.	1/32" x 1/30"
21 ft.	1/16" x 1/30"
21 ft.	3/32" x 1/30"
21 ft.	5/32" x 1/30"
21 ft.	3/16" x 1/30"

$1 Assortment "C"

210 ft.	1/8" x 1/30"
42 ft.	3/32" x 1/30"
& 3 oz.	lubricant

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1/16" x 3"	3.00
3/32" x 2"	1.05
3/32" x 3"	3.00
1/8" x 2"	1.20

1/8" x 3"	3.00
3/16" x 2"	1.50
3/16" x 3"	3.00
1/4" x 2"	1.80
1/4" x 3"	3.60
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1½" x 1½"	1.38

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2" x 3"	3.00
2" x 4"	4.08
2" x 6"	6.00
3" x 3"	4.50
3" x 6"	9.00

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9"	2.00
10"	2.40
12"	3.00

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1/8 x 3/8 .....24 for .15
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3/16 x 1/4 .....10 for .07
1/4 x 1/4 .....10 for .08
1/4 x 3/8 ..... 6 for .08
1/4 x 1/2 ..... 6 for .09
3/8 x 3/8 ..... 6 for .09
3/8 x 1/2 ..... 6 for .10
1/2 x 1/2 ..... 4 for .10
1 x 1 ..... 2 for .16

Plank Balsa

1 x 3 x 36.....25
1 x 6 x 36.....38
2 x 3 x 36.....42
2 x 6 x 36.....75
2 x 5 x 40.....75

Sheet Balsa (18" Lengths)

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1/16 x 2.....4 for .06
1/8 x 2.....4 for .09
3/16 x 2.....2 for .08
1/4 x 2.....2 for .09

Prop Blocks

⅛ x ¾ x 5.....8 for .06
⅛ x ¾ x 6.....8 for .07
¼ x 1 x 6.....4 for .09
⅜ x 1 x 8.....4 for .06
¾ x 1½ x 8.....4 for .08
¾ x 1½ x 10.....4 for .09
¾ x 1½ x 11.....2 for .07
¾ x 1½ x 11.....2 for .08
¾ x 1½ x 12.....2 for .07
¾ x 1½ x 12.....2 for .09
¾ x 1½ x 14.....2 for .16

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3 View Drawing of the Waco Cabin Plane
3 View Drawing of Hall-Springfield Racer
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How To Build The Stinson "R" Cabin Plane

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Kits 25¢ each
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INTERNATIONAL MODELS CO.
1771 Broadway New York

Fighting Wings

(Continued from page 9)

we landed that we were "too late," now inquired: "Why stop the war now?" And the war went right on, bigger and bloodier.

I was out of a job a few days, when one of the boys borrowed my ship and it let him down in what we called a "seven-point landing"—two wheels, tailskid, nose plate, two upper wings and upper part of the rudder. I got my third ship and had it tuned up.

About this time we heard the entire sky buzzing. Rushing out we saw eighty-two large Allied planes in formation.

"Good night Germany!" yelled someone. The roar was like thunder—or the New York subway. We heard that those planes were part of the largest aerial call ever made on Germany—250 bombers, 100 *chasse* planes for protection and 50-odd three-seater fighters. They were reported to have dropped thirty-two tons of bombs. Only one plane—a slow bomber—failed to return.

OUR squadron kept hammering away and won almost every combat. We brought down planes and balloons with very small losses to ourselves. Bad weather kept us down and for twelve days I got in only six minutes of flying. We were really glad when the sun came out and we could get to work.

October 18th, our patrol saw Archies bursting—our own—a sure sign some enemy aircraft had been spotted. We flew eight or ten miles in some six minutes. We found a lone German. Three of us speeded up. The enemy headed for a cloud and our leader opened fire. Finally I got ahead and let go with both guns.

But I was still a quarter of a mile away. I shot all around him, but he vanished into the clouds.

Rather disgusted, I hunted trouble, but finally found none, and came home. There I found Clint Jones, my side-kick and rival. Our score was tied at four each. I was writing my report when Clint came in.

"Well," he stuttered, "I g-g-g-got you again."

I hated to call him a liar—but I had to say: "How do you get that way? *You* weren't in the patrol."

True enough. But it turned out he had gone up behind us—and when that lone German had lost us, the unlucky devil had dropped out from the clouds, right in front of Clint and his comrade!

Jones had a beautiful idea that he had been trying to pull off—to bring down a German without firing a shot. Force him down. Get a prisoner, plane and all. A fine trick, if you could do it!

Clint grinned all over as he told his story. "I e-c-caught up with him and f-f-flew alongside. I m-m-m-motioned him to g-go down. But the s-s-son of a g-g-gun t-tried to sh-sh-shoot at me!

"So I s-s-said: 'M-M-McCarthy, you're my m-m-meat.' I had to sh-shoot the p-p-p-pilot in the eye and p-p-put some b-bullets in his gas t-t-t-t-tank, and the observer j-j-jumped, and M-M-McCarthy, or whoever he was, went down below.

"M-meantime a fire s-s-s-started in my own p-p-plane, and I was f-f-f-forced to land in some w-w-wire entanglements."

We all ran to inspect the remains of the plane, and Clint produced what we all wanted—the lens from the German's camera. They were fine horses, and orders were to turn them in. But we always forgot to, when lucky enough to get one, thus depriving some quartermaster of a fine camera when he got home.

In this same combat, Lieut. Vernam brought down an observer, and Lieut. Gervys Grylls, only three weeks with our squadron, pursued five D.F.W.s and shot down the tail-ender.

CLINT now had the edge on me, and I was keen to even up the score. That afternoon our patrol broke up and two of us flew together. Enemy planes seemed to fill the sky. Suddenly I saw my companion diving for a group of three below us, and *failing to see a flight of about fifteen in the sun above us.* If a pilot has any dates for after the war, he *must* see the enemy hiding in the blinding light of the sun.

I signaled frantically, waving my wings and cutting across his nose. His thoughts seemed to be anywhere but there. He attacked the three with vigor!

I guarded him from the rear, as best I could. Too late he saw the attack from above. They closed in on us. Under attack first, I got out of trouble, then circled at high speed to stalk a German before he could reach my unobservant comrade.

I made the tightest turn of my career, in rear of the enemy formation. But too late. My comrade was falling in flames. But so was one of the enemy!

I took a potshot at the nearest Fritzie and he started dropping out of formation. More of the Germans closed in. I disliked being mentioned in the obituary notices so I put on a few gyrations, hard on the heart but good for the skin, diving through an opening in the cordon about me, and dashing toward home—thirty miles away.

Fokkers began falling out of the sky around me. But the nose of my Spad, once pointed downward, could outspeed any Fokker built during the war. And it was probably ten miles an hour faster on the straightaway.

So I was soon tearing for home—and maybe those gray and green mottled, camouflaged buildings didn't look good! But the loss of a comrade, a good pilot and a real man, always cast a shadow over us, which sometimes lasted for days. If only war could be fought without death and disease as grim, eternal camp-followers!

About October 20th, the Germans assembled what was said to be the greatest concentration of *chasse* planes since the war began. Circuses and squadrons made up of aces, swept over our sector in great numbers. On one sweeping glance, at Dun-Sur-Meuse, I counted sixty-odd Fokkers!

BUT picking a fight with the Germans was not so easy now. Flying through heavy mist one morning, clouds keeping us down to some 6,000 feet and flying almost wing-to-wing, we suddenly spotted five enemy planes some miles distant. They were stalking Allied pilots, just as we were stalking theirs. The hunters hunted.

They caught sight of us—and were off like shots into their private cloud bank. To follow would have been a wild-goose chase. To fly underneath would give them

(Continued on page 40)

Air Ways—Here and There

(Continued from page 24)

makes the ship look very realistic. From what we can see, we would say it is a very well-proportioned job.

Leo Rohon of 116 East Union Street, Nanticoke, Pa., is responsible for the small speck in the sky, shown in picture No. 20. This speck is nothing more than a 30-inch wing spread smoke screen model, built by Rohon. As far as the flying qualities of the ship are concerned, the picture speaks for itself. As you see, it is in flight high above a two-story brick building. The model has an exceptionally large propeller and is powered with 20 strands of ⅛" rubber. Rohon says it has plenty of speed and climb, which we can well believe.

CLUB NEWS

Trenton Model Flying Club

The Trenton Model Flying Club, sponsored by the Trenton, New Jersey, Y.M.C.A., recently conducted a scale model contest in March. The contest was open to any resident of Mercer County and ribbons, together with Construction Kits, were awarded to the three best in each class. The models were judged at the Y.M.C.A. by a group of judges consisting of Ambrose Banks, war-time pilot; Gill Robb Wilson, also a war-time pilot; New Jersey State Commissioner of Aviation; Arch Maddock, racing pilot and manager of Mercer Airport; Milton St. Clair, engineer of the Switlick Parachute and Equipment Company and war-time ace; Russell Read and Robert Grosch, local manual training teachers; Robert Garrett, organizer of the T.M.F.C., and its first adviser; and Stanley Krzyownos, present adviser of the group.

The entries ranged in size from a 1¼" Spad to an exceptionally fine model, a P.H. Racer, 64 inches in wing spread. These models, 80 in number, which are shown in picture No. 21, were divided into four classes: Class A, under 12" wing spread; Class B, over 12" and including 24" wing spread; Class C, over 24" and including 36" wing spread; and Class D, over 36" wing span.

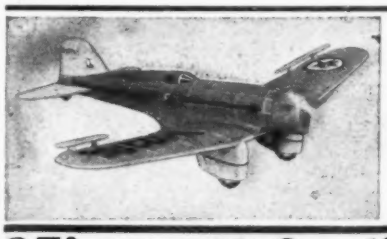
A special mention and award of "Best in the Show" was made to a group of eleven solid models ranging from a 2-inch model of Ben Howard's Racer to a 6-inch Great Lakes Trainer. A 2¼-inch model of the Gee-Bee was said by several of the judges to be perfect.

Plans are now being made to organize a senior branch of the T.M.F.C., to accommodate the large number of older fellows contacted through the meet.

The T.M.F.C. is the oldest and most active model airplane club in the vicinity of Trenton. It meets every Monday night at 7:30 p.m. under competent leadership at the Y.M.C.A. It is a working group, and besides shop periods, conducts numerous talks and demonstrations on the theory and practice of scale model building.

CHICAGO recently held a model meet under the auspices of the Aeronautical Association of America at the Aragon ballroom. The winners are shown in picture No. 22, bottom row. They are: Miss

(Continued on page 46)



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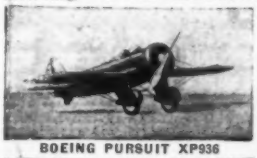
BOEING PURSUIT XP936

WEDELL WILLIAMS RACER 92

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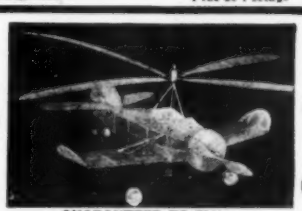
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1/8 x3/8 5 for 10c
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1/16 x 3 ..... 9c
1/8 x 2 ..... 6c
1/8 x 3 ..... 11c
1/4 x 2 ..... 10c
1/4 x 3 ..... 17c
1/64 x 2 x 18". 2 for 5c

Propeller Blocks
⅜ x ½ x 5.....1c
½ x ⅝ x 5, 2 for 4c
⅞ x ⅞ x 6, 3 for 5c
⅝ x ¾ x 7½.....3c
⅝ x 1 x 8, 2 for 5c
⅞ x 1½ x 11....7c
1 x 1¾ x 12.....9c

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For 1⅛" wheels, per pr. 20c
For 1⅜" wheels, per pr. 25c

Featherweight Aluminum Wheels
¾ 1" diam., per pr.....10c
1⅛" diam., per pr.....15c

Scale Model Tissue
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Reed
1/32", 1/16", 3/32", 1/8" 6 ft. 5c

Camel Hair Brushes
Each 5c

Pinhole Washers
1/8" or 1/4" Per doz. 1½c

Wood Veneer Paper
Sheet 20" x 30". 2 for 25c

Music Wire
(Not Coiled)
.010", .014", .017", .020", .024", .028", and .034". 3 ft. 1c
.037", and .040" 3 ft. 2c

Dowels
⅛" x 36" ..2 for 5c

Scientific Cement
1 oz. bottle.....10c
Large 2 oz. can. 16c
5 oz. can.....30c

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1/16" sq., 1/10" flat, 3/32" flat, 1/8" flat, 3/10" flat. 3 ft. 1c

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In all colors.
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Fighting Wings

(Continued from page 38)

a fighting advantage. So we let them go.

The weather was bad and for one reason or another it was now nearly a month since I had brought down an enemy. But we kept our hand in. On patrol our hearts would turn turtle every few minutes when a crackling "rat-tat-tat-tat" suddenly split the air.

Necks craned—above, below, behind. Every man was on pins and needles, for we expected the enemy any moment. We were both hunter and hunted. But the burst was only one of our pilots turning out to test his guns. Usually he got back into the "V" before we could spot him. Things move fast in the air.

After a few such bursts the strain and excitement would become terrific. No place for weak hearts! Then we came home through hail and rain, quite often, which at two hundred kilometers an hour felt like a whip on the face.

Finally, one day, my motor quit just as the 'drome hove into sight. I switched on "nourrice"—emergency tank good for fifteen minutes of flying—and arrived with the patrol. On the landing a plane ahead of me struck a rough spot, (we were landing *with* the wind), and nosed over onto its back.

That was enough to relax the tension and gave us something to razz the pilot about. Thus we kept our hand in and our spirits up.

Next day, the 23rd, occurred one of those things I shall never forget, if I live to be 150. Flying rear high man, with Clint Jones opposite (I chose this position as Flight Commander because I could better watch the whole sky), we overtook a bi-place Rumpler.

I scanned the sky for a protecting squadron. I saw none, but did see a balloon in flames, some miles distant, between Grand Pré and Buzancy. I had a hunch it was one of our own observation sausages, and a jagged line of smoke-puffs showed where the raider was hitting the high spots.

I left the Rumpler to the tender mercies of the patrol, and "crawled" behind the German, whose machine was slower. One's own motor drowns out all others, and thus the pilot who is skillful enough can slip into another's "blind spot."

HE coasted along at a good clip, no doubt pleased with his raid on our balloon, which probably killed the observer and "put out the eyes" of our troops in that sector till another could be sent up.

I closed in to a hundred and fifty feet. My intended victim swung his machine from right to left, looking from side to side for a pursuer. But as he swung, I swung with him, always in his blind spot, never visible because I followed his every movement.

I took one last look all around, just to be sure. No one else in sight. What a thrill it must have given observers on the ground as now, almost under his tail, I nosed the plane up inches at a time, slowly creeping up to the very best, most fatal point of attack. One final glance around, then I aimed my guns and pulled both triggers.

Hot lead went into his gas tank, but missed him. Flames and black smoke burst forth. I pulled to one side to escape the boiling searing flames, so soon to become a falling funeral pyre.

I was now alongside, and my defeated antagonist saw me—for the first time. His onrush slackened. His plane seemed poised in midair for a few brief moments.

Then—for an eternity—the war ceased to exist for me. My whole inner being seemed to turn inside out.

For my "enemy," knowing as he must have that here was the end of his aerial trail—the point from which he would in a second or two plunge into a roaring, searing, cremating death—with no power on earth to save him: fully realizing this, and that I was the immediate cause of it all—calmly turned in his seat, smiled—and waved at me!

A man to the very end—a true flying man and a brave soldier—he had played the dangerous game, gambled his life for his country, and lost. With a smile.

I waved back—the salute to a dying gladiator. In a few moments the roaring mass had fallen scores—hundred—several thousand feet, leaving a trail of black smoke. It was the end—the "glorious end"—of a man.

And I felt sick, for the first time in my fighting career.

(Concluded Next Month)

New Wings For Our Airplanes

(Continued from page 7)

fight with superior forces among the German shrapnel bursts over Verdun. Like every other winner of the prized decoration, he was given a week's leave to show it in Paris, and while he was doing that, Jacques Gérin saw the shopkeeper and his window-curtain and the idea he had been searching for came to him like a flash. For the Gérin variable wing is, in effect, a splint window-curtain that runs along the edge of the fixed portion of the wing and doubles or triples its depth.

Of course, it was no such simple matter as going out and building a splint window-curtain for an airplane wing right away. It was ten years after the war before the young inventor even got his variable wing system in shape for tests and after that came four years more of alterations and improvements. But this time was not wasted. Young Gérin became known as a mechanical engineer who had something. He invented a car with the motor in the rear and a valveless motor, both of which succeeded and the money from which helped him enormously on his variable wing experiments, as well as brought him to the attention of the aviation authorities of France. Now he is one of the best known inventors in the country and anything he does commands respect, hence the official backing for the variable surface wing.

The wing itself is still the window-curtain, however. It has two parts: the fixed and movable portions. The fixed portion, which will carry the load when the airplane is in free flight at full speed, is very solid as is necessary when one considers that the load on it is in the neighborhood of 600 pounds per square yard of surface. It is based on two heavy longerons of metal,

tubular in section. On these longerons are threaded a series of duralumin caissons, or boxes, each of which forms a perfectly rigid, very tight box, only 13¾ inches deep.

In this box runs a heavy chain. Attached to the chain are a series of long, strong duralumin fins, attached together, but not rigidly attached. These fins carry the extra wing surface which is of doped fabric and the whole business (fins and fabric) rolls on a drum, inside the fuselage.

Gérin machines have to be biplanes or triplanes to get the necessary bracing, but they do not suffer from the interference between the surfaces that the ordinary biplane or triplane does, as the wings are too narrow from front to back to create such interference. The controls of the movable extra portions of the wings are entirely automatic and those of the upper wing are entirely separated from the lower. Each wing is provided with its own electrical arrangements (the control is electric) and a "critical speed indicator" which is connected with the air-speed indicator.

THIS gadget works as follows. When the machine takes off, the wings are opened to their fullest extent to provide a big supporting surface. As soon as it gets into free flight, the speed commences to mount. As the needle of the air-speed indicator crosses the 80-kilometers-an-hour figure (which is the "critical speed" for the two machines now building), a white light on the instrument board goes on, an electrical connection is made and the extra portion of the wing rolls onto its drum automatically. The airplane is now in full, free flight; with the reduced surface its speed jumps to a figure that is hardly believable.

When the moment for landing comes and the pilot throttles down, or when the machine slows down for any reason at all (motor trouble or what have you), the needle of the air-speed indicator of course drops to the critical speed point again. As soon as this happens a red light goes on, there is another electrical connection, and the extra surface unrolls automatically.

The machines now building have different critical speeds for the upper and lower wings. That is, in taking off, the lower wing will fold up first and the plane will be a sesquiplane for a few minutes while she is picking up speed. When she lands the procedure will be reversed; the upper wing will unfold first, the airplane's speed will be braked down, then out comes the lower wing and the pilot is ready to level off.

When it comes to the actual figures, the Gérin has a taking-off and landing speed of somewhere around 44 miles an hour, with a designed high speed of 205 miles an hour. All this is done on a single 120 h.p. Salmson motor. With a real pursuit-plane motor, say a 300 h.p. Lorraine, there is no telling what she would do. With the reduced surfaces only, she has a total surface of 73 square feet and when the wings are spread out to their fullest extent, a surface of 301 square feet.

The controls for the two wings are made separate to provide against accidents and the possible jamming of the apparatus in flight, although the French Air Ministry, which tried to test one of Gérin's wings to destruction and didn't succeed (the wing would not break down under the utmost the testing machines could give it), is very reassuring about the operation in flight. "The opening and closing of the mobile surface of the Gérin wing," says their report, "operates in a wholly satisfactory manner in spite of the deformations of the mobile surface which occur at high speeds." In practice, of course, the mobile surface will not be there at high speed.

WITH the upper wing alone opened out, the Gérin would have a landing speed about that of a fast military two-seater; with both wings at their reduced surface the landing speed would be dangerously high, though perhaps not impossible. The greatest difficulty in landing with the small surface would be the plane's extreme sensitiveness on the controls, the fin and rudder being large enough to control her with the full surface.

And is she safe? *"Dis donc!"* cries M. Jacques Gérin, becoming excited at once when this question is shot at him. "Listen, do you know the cause of most airplane accidents? It is because the wings break and come off. Do you know why? Because the present wide wings, in free flight, are subject to stresses applied at all points of the surface, from front to back, and changing rapidly, both from place to place and in quantity, during the course of a flight when the aviator performs evolutions. If you have enough factor of safety, your wing is too heavy, and zut! you cannot fly. But if the wing surface is very small, then the structure can be very solid; it can carry any load at all, and the pressure all over the surface will not vary. That's what my wing does. Ask the Air Ministry. It's as simple as saying 'Good morning.'"

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3/16x3/16	.12 for .05		
3/16x1/4	.13 for .05		
3/16x3/8	.8 for .05		
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⅝x1¼x12"	1 for .04
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1x3x18"	2 for .17

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The Aerodynamic Design of the Model Plane

(Continued from page 37)

models that have been erratic. They would stall, dive and execute various gyrations which the builder had never intended and which he could not correct, try as best he could. The answer in many cases is, increase the area of the stabilizer, especially in the case of scale flying models. The results will surprise you. When designers of large commercial planes fully realize this fact, the planes they design will be much safer to ride in. A full discussion of the theory involved in this statement will be given in the second part of this chapter, which will appear in future issues of the magazine.

By this time you are probably saying to yourself, "Well, how much area should be given to the stabilizer in order to insure satisfactory results?" The area required varies with different types of models as you might suspect. Readers who do not wish to calculate the exact area but who will be satisfied with approximate values, accurate for most cases, may apply the following general rule.

First, as a general rule for all model planes, when the stabilizer is set at the proper angle given in the table of correct stabilizer settings:—Make the area of the stabilizer equal to *one-third* the wing area. This value is not exactly correct for every type of model but will serve as a general rule when you do not wish to analyze the problem more thoroughly. If you wish to be more exact in respect to the proper amount of stabilizer area, it is wise to subdivide model planes into various classifications.

1. In the case of single propeller tractor stick type monoplanes *without* a landing gear, make the area of the stabilizer equal to 40% of the wing area. This value is based on the facts that the center of gravity is *above* the line of thrust and the propeller is located a considerable distance in front of the wing.

2. In the case of single propeller tractor stick type monoplanes *with* a landing gear, make the area of the stabilizer equal to 30% to 35% of the wing area. (The center of gravity is usually below the line of thrust in this case.)

3. When the model is a single propeller tractor fuselage type monoplane with a landing gear, the stabilizer area should be 25% to 30% of the wing area. This value is based on the assumption that the center of gravity is below the line of thrust and that the nose of the model is fairly short, the propeller being close to the wing. The longer the nose of the model, the larger the stabilizer area should be.

4. When the model is a twin propeller tractor monoplane of the stick type, the stabilizer area should be from 35% to 40% of the wing area.

5. In the case of models with tail booms extending out to the rear of the fuselage, make the stabilizer area 5% less than allowed in the above cases.

6. The stabilizer area, of *biplane* models of the several types mentioned above, may be 5% *less* in area.

The above values are accurate for the angular settings of the stabilizer, given on the preceding pages, for the various wing positions and for a stabilizer moment arm length of *one-half* the wing span.

We now come to the point where you should know how the amount of stabilizer area required is influenced by the moment arm, the angular setting of the stabilizer and the value of the various *disturbing* factors, as wing chord, length of fuselage nose, etc. Next month we will tell you some enlightening facts about this problem, and a formula will be given which will apply to all cases.

Until then, "Happy Landings."

Maneuver Contest

(Continued from page 32)

Albert Richard Cline, Derry, Pa.
Roger F. Parkhill, Minneapolis, Minn.
John Alfirevic, Chicago, Illinois.
Alvin J. Brault, New London, Wisconsin.
Philip Chandler, Nashville, Tenn.
John U. Allen, Laurium, Michigan.
Howard Ginther, Lansing, Michigan.
Manley Mills, Royston, Georgia.
Arnold J. Gregerson, Mason City, Iowa.
Ike L. Kibbe, Austin, Texas.
L. H. Tarbox, Great Kills, S. I., N. Y.
William Drake, Malden, Mass.
Ogden Whitney, Bronx, New York.

Answer to April Cover Picture

In airplane racing, the pilot has a peculiar problem. As the course is usually a triangle, the perimeter of which is five miles, he must make sharp turns at intervals of 1 2/3 miles. This keeps him very busy making one turn about every half minute. Each one of these turns slows the plane down greatly but the best racing pilots somehow have an uncanny knack of making a good average speed, in spite of this handicap. The problem is how to turn and lose the *least* speed.

The drawing which heads this article shows the three forms of turns most used in racing and also gives an idea of the layout of a race course. We will assume that the same make of plane is being used for each turn shown and that its top speed is 145 m.p.h.

THE plane flying the (1) course goes into the turn at 140 m.p.h., rounding it with a *vertical* bank at full throttle and is off again with the least possible loss of speed and distance. (See map in upper right hand corner.) However, its speed has been reduced to a certain extent, which must be increased to 140 m.p.h., before the next pylon is reached. This type of turn is called a vertical bank turn.

The racing pilot flying the (2) course around the turn, approaches it at 140 m.p.h. Just before he gets to the turn, he goes into a rather steep climb and with ordinary banking takes the turn while climbing, consequently gaining some altitude. This maneuver reduces his speed sufficiently to take the turn sharply, without excessive banking. The lost speed is regained by flying downhill after the turn has been made, which he can do because of the altitude he gained when making the turn. However, he has traveled a slightly greater distance than (1) plane so after the turn, the two will be about even again, though the (2) plane flew faster. This second turn is called a climbing turn and is usually done at full throttle.

The pilot on the (3) course is making the safest type of turn, the wide, normal turn which only reduces the speed slightly but requires so much more distance than the other two turns that the average speed for the (3) plane will be much less than the speed of the first two racers.

The maneuver being executed on the cover is a vertical bank turn.

In the center of the page, you will see diagrams of the control positions while executing the vertical bank, or flipper turn around the pylon. This maneuver is far from safe and requires great skill and good judgment. To begin the turn, the controls are put as at A, which drops the left wing sharply and rudders the ship into the turn, throttle full on. Instantly the controls must be put into position B, which puts the ship into a near vertical bank, takes away the left rudder and changes it to a little "top rudder" to prevent the plane diving into the ground. Note that the elevators or "flippers" now are serving as strong rudders and the plane is really "climbing" directly to the left. Putting the controls into B position "straightens her out" for the next straightaway.

Try this in your next trophy race.

Build This World Record Fuselage Model

(Continued from page 11)

THE landing gear is made entirely of bamboo. The end of the struts are pointed sharply and stuck into the fuselage and ambroided. The drawing will help clear up the landing gear construction. The axles are from medium wire and washes are glued on each side of the wheels to prevent wear. The wheels are kept on the axles by bending the tips of each axle. The tread of the landing gear is about seven inches. This is not so important since the model hops off very quickly when wound. The tail skid is bent bamboo and is glued to the fuselage.

Wing

Eighteen ribs of the Clark-Y section are cut from 1/32 inch flat balsa for the main wing. The leading edge is 3/32 square balsa and fits into a notch cut in the front of each rib. The trailing edge is 3/32 x ¼ sanded to a triangular shape to complete the shape of the wing. The main spars are 3/32 inch square balsa. The tips on the wing, like those on the elevator and rudder are bent from 1/16 inch square balsa. This is done by wrapping the wood, which has been thoroughly soaked, around a can of the correct diameter which is kept hot by gas burner. The two halves of the wing are constructed, then joined by means of four pieces of balsa just two inches long, the width of the fuselage. Two pieces are 3/32, the same size as the spars and the other two pieces are the same as the leading and trailing edges. Raise each tip 2 inches. Make sure the wing fits the fuselage firmly and ambroid four small hooks to the leading and trailing edges of the center section. These hooks are used to hold the wing to the fuselage by means of rubber bands. After the tips which you have bent are thoroughly dry, cut to size and butt-joint to the leading and trailing edges.

Empennage

The elevator and rudder are constructed in the same manner and all the necessary

information is available from the drawing. One suggestion, however: the center rib of the elevator is cut back of the notch for the rear spar and the trailing edge is brought in to form a V which gives the necessary room for attaching the rudder.

Propeller

Probably the most important thing on any model is the propeller and since a propeller of 17 inches is used, it is necessary that it be of good design and construction. The propeller is carved from a balsa block 1¼ x 1⅞ x 17. The side view and the full-sized shape of the blades will make it clear how to shape the blank. At the tip of this blank the dimensions are ⅜ x 1⅞, giving the propeller a pitch of about 1.5 the diameter or 25.5 inches. The approximate area is 25 square inches. This propeller seems a fair approach to the true pitch helical type. Carve the prop so the blades taper from 3/16 at the center to 1/32 at the tip.

CAMBER to the extent of ⅛ may be put into the blades but it is easier and almost as efficient to form the blades to the shape of a wind section. Prepare for a deluge of chips and shavings and do not hesitate to spend a great deal of time carving the propeller. Ambroid washers to prevent the shaft from wearing the propeller. Free-spinning propeller aids the flight a great deal because the resistance of the propeller is greatly reduced. In a long soaring flight a free-spinning propeller is most essential. This can be added by bending a hook in the end of the propeller shaft and adding a small spring. When the rubber is wound the energy will cause the hook to be pulled back so it catches the propeller and turns it. When it is unwound the spring will throw the hook clear of the propeller allowing it to spin freely with the wind. Be sure to ambroid a washer at the point where the hook pierces the propeller or shortly you will find yourself having two fine propeller blades but no hub.

Covering

The model is covered with Japanese tissue and doped. Colored paper or colored dope improves the appearance of the model. The cellophane is glued directly to the paper where no struts are available.

Assembly

Ambroid rudder in position, allowing for the thickness of the elevator between the fuselage and the first rudder rib. It is best to give the model slight right rudder because the performance will be improved by a right circle. The elevator is ambroided in position. Make sure it will be perpendicular to the rudder and in line with the wing. The elevator is given one degree negative incidence. This means placing a block of ⅛ inch balsa between the rear spar and the fuselage. The wing is placed on the body in the position illustrated and secured by rubber bands. It is well to raise the leading edge of the wing, giving the wing one or two degrees incidence. Use 8-10 strands of ⅛ inch flat lubricated rubber.

Flying

GLIDE, adjusting the wing until a long, smooth glide is obtained. Check up on the angle of the elevator and the wing. By increasing the number of degrees negative of the elevator, the tendency to climb will be improved. When testing, strive to secure a floating flight, that is, when the model always seems to be beginning a stall. When fully wound the added thrust will provide a fine angle of climb and the glide will be good. It is possible with slack rubber well lubricated, to wind 1200 turns. On a clear, hot day flights of hours are possible if you have means of following the model in two directions—vertically and horizontally. Usually the model disappears in the sky above. I have lost five of this type model in this way. To date my best flight is 51 minutes, 42 seconds.

Who Developed the Airplane?

(Continued from page 16)

considered the, "Father of Aeronautics." He suggested the main features in the present day aeroplane.

Caylay's work aroused much interest in the science of flight and his experiments were further developed by William Samuel Henson and John Stringfellow, who were affiliated in their efforts to advance aeronautics. In 1842, Henson actually took out a patent on a flying machine of the monoplane type, motored by a steam engine and driven by two propelling screws. He organized a company to carry passengers, mail and parcels, but as the big machine was never built, the company did not materialize. Henson and Stringfellow built several working models of their aeroplane, the most successful of which was one that Stringfellow built in 1848, which weighed only eight pounds and accomplished the first flight recorded for a power-driven heavier-than-aircraft model.

ANOTHER pioneer worth mentioning in this period is F. H. Wenham, who wrote and illustrated articles on aerodynamics. He showed very clearly how lift could be obtained from using a high aspect ratio, or long narrow plane. What he suggested was the construction of aircraft with two or more lifting surfaces placed one above the other so as to secure a maximum of lifting power within a reasonable space. The type of construction he advocated was in fact, the same as the biplane of today.

Passing over a period of twenty-five years, we come to the Hon. Charles A. Parsons, noted for his work on the marine turbine. Parsons built a small monoplane model with a span of eleven feet and a chord of two feet. A tiny steam engine working at about fifty pounds to the square inch was used for motive power. The model, which weighed only three and one-half pounds, made flights of about one hundred yards. Parsons' achievement is mentioned because his model appeared similar to the present day planes in so many aspects.

You have probably noticed the use of model aeroplanes in the above inventor's attempts to solve the mysteries of flight. The model aeroplane is not a toy but a valuable instrument to further youths' knowledge of the science of aerodynamics.

Next month we shall tell you something about the great pioneers, Professor Samuel Pierpont Langley, Sir Hiram S. Maxim, Otto Lilienthal, and Percy S. Pilcher.

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1/16 x 3/16	20 for	.05	3/32 x 2	6 for	.10
3/32 x 3/32	21 for	.05	1/8 x 2	5 for	.10
1/8 x 1/8	20 for	.05	3/16 x 2	4 for	.12
1/8 x 3/16	14 for	.05	1/4 x 2	3 for	.11
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1" x 3"	1 for	.15	⅝ x 1 x 7	3 for	.05
1" x 6"	1 for	.25	¾ x 1 x 8	2 for	.05
1½" x 1½"	1 for	.13	¾ x 1¼ x 10	1 for	.03
2" x 2"	1 for	.20	¾ x 1½ x 12	1 for	.04
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1 pt.	.45	1 qt. .75	3/32" flat	20 ft.	.05
COLORED DOPE			1/8" flat	17 ft.	.05
White, yellow, orange, red, green, olive drab, blue, black, silver, gold. 2 oz. .10 4 oz. .19			3/16" flat	12 ft.	.05
THINNER			THRUST BEARINGS		
2 oz.	.07	4 oz. .13	Small or large, 1 doz.		.15
JAPANESE TISSUE			BAMBOO		
White .18 per doz. Colored—Yellow, blue, red, green, orange, black, olive drab—ass't. .20 per doz.			1/16" x 1/16" x 10½	35 for	.05
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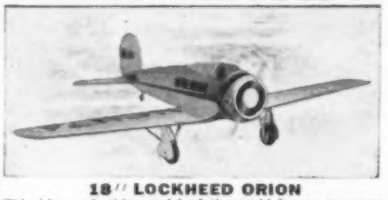

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A Twin Tractor That Amazed Experts

(Continued from page 26)

(B and B′) to the points (P and P′). These points are 12″ from the rear ends of the sticks (T). From here the sticks taper from ¼″ square to ¼″ by ⅛″ at the rear (T) as given in the diagram. Taper these before starting to assemble the frame. Next cut a slot in the front end of each stringer as shown at (B) and (B′) into which the propeller bearings shown in Fig. No. 10 are to be cemented. The end (B) fits into the slot. Be sure it is straight in the slot and well cemented.

NOW bevel off the rear ends of each stick as shown in Fig. No. 9, so they can be cemented together. (Do not cement them until later.) After beveling the rear ends, assemble the front ends of both stringers to the chassis as at (B) and (B′) Fig. No. 8, and as at (V) Fig. 10-A. The loop (V) of the chassis, Fig. No. 6, is placed up against the under side of the left frame stick and bound in place with thread (T) Fig. 10-A, and (B) Fig. No. 8, (C) is the wire leading to the wheel and (N) is the cross wire leading to the other frame stick. Bind the right hand frame stick to the loop (V′) in like manner. A small triangular piece of balsa (R) may be cemented to the stick and propeller bearing as shown in Figs. No. 8 and No. 10-A. This braces the bearing against the tension of the rubber.

When the sticks are bound properly to the chassis, cover the joints with cement and let them dry. While this is taking place, cement the two sticks together at the rear (T) Fig. No. 9, and hold them together with a clamp until thoroughly dry.

The chassis cross braces are now fastened to the frame at (M) and (N) Fig. No. 8, with thread, 8½″ back from the bearings. The sections (D-A) and (C-B), Fig. No. 7, are bound tightly to the underside of the stringers at these points. Now pass the ends of the axles (S) through the loops (K) and (K′) of the chassis. The wheels should now be slipped on the axle ends (S) and these ends bent up into position (S′) as shown in Fig. No. 7. Fig. No. 11 shows how the axle is passed through loop (L), through wheel and the end bent up at (E). Wire (C) is the chassis strut. The wires of the cross brace are bound together at (X), Fig. No. 8 with thread which is then covered with cement. The wheels are made of hard wood (birch) 1½″ in diameter and ⅛″ thick. The hole at the center is 1/32″ in diameter.

The frame brace motor supports are slipped down over the stringers (A-A′), Fig. No. 5 at (C-C′), Fig. No. 8, 18 inches from the propeller bearings. Cement this part to the stringers. Now fit the motor hook, Fig. No. 3, over the rear end of the frame (T) so it is tightly in place, then cement it to the frame with plenty of cement. Lastly, cement the two elevation blocks to the top of the stringers at (E) and (E′). They should be made of balsa ¼″ wide, 3/16″ high and 2″ long. The front ends should be 11¾ inches from the propeller bearings.

THE frame is now complete and you are ready to build your wings. The main wing is composed of a sheet of light balsa wood 1/32″ thick, 36″ long and 4½″ wide, rounded at the ends as shown in Fig. 12, to the under side of which the ribs are cemented at the intervals shown by the dimensions on the drawing. Fig. No. 14 gives the exact outline of the rib. Make a pattern from the drawing, Fig. No. 14, and cut out ten ribs from 1/16″ balsa veneer. Fig. No. 15 shows how they are cemented to the under side of the top sheet of veneer. First cement the two center ribs in place and then the two ribs that are the fourth in each wing from the center. Clamp the edges, front and rear, of the top sheet, down to each rib by paper clips, as at (C) and (C′), Fig. No. 12. Cut a notch, Fig. No. 15, for the clip to catch in so it will not slip off. When the cement holding the ribs has thoroughly dried, take off the clips. Then cement the spars in place that run from the center of the wing to the fourth rib, as shown in Fig. No. 12.

After this has been done, cement ribs No. 2 and No. 3 from the center, in place over the spar. The two end ribs may then be assembled to the balsa top sheet. Now, cement the lower leading edge strip to the under front side of the rib, Fig. No. 15, and hold it in place by sticking pins (P-P′) up through it and the rib, at the front and rear edges of the strip.

This strip is of balsa 1/32″ thick, ⅜″ wide and 36″ long. It is shown at the front edge of the wing, Fig. No. 12, by the dotted line (M-N) and the lower cross lined section, Fig. No. 15. Now cement the front edges of the top sheet and lower leading edge strip together, pinning them together between the ribs so as to make a tight joint. At the ends (M) and (N), Fig. No. 12, trim the lower strip to conform with the top sheet at the curved ends and cement the front edges together here in the same manner.

At (F), Fig. No. 12, you will notice that there are two short dummy ribs. These are to brace the wing where it rests on the elevation blocks. They are made exactly the same thickness and shape as the other ribs, except that their rear portion is cut away. They are shown in Fig. No. 14 by (A, M, N). Cement them in place as shown in Fig. No. 12.

When the cement has thoroughly dried (about 45 minutes) take out the pins and cut the top sheet of the wing at the center along the line (X) Figs. (12) and (13). With sandpaper, sand off these edges at the center (X) about 1/16″, and slightly less toward the front and rear edges of the wing, so as to allow the wing to be creased at the center with each tip being raised exactly three inches as shown in Fig. No. 13. This is called a dihedral angle. It should be nine degrees (9°). Now cement together again the cut and sanded edges at the center (X), putting plenty of cement on the joint. Then let the joint dry *with each wing tip* raised three inches as shown, Fig. No. 13. This is important. When the joint is thoroughly dry, cement two strips of balsa 1/32″ thick to the under side of the upper balsa surface, along the trailing edge. These strips should extend from the crease at the center of the wing, outward across two wing panels. The strips should be 3/8″ wide at the center line of the wing and ⅛″ wide at the point where it ends at the third rib from the center. These strips are to strengthen the rear trailing edge where the rubber bands that hold the wing to the frame, cross the rear edge. This prevents them from cutting into the wing.

NOW you are ready to cover the rear under sides of the wing with Jap tissue paper. Cement the paper to one-half the wing at a time, starting at the center rib and working out progressively toward the tip of the wing, cementing the paper to each rib as you proceed. Then cement the paper at the front to the lower leading edge strip, overlapping it on the strip about 3/16″ as shown by line (P-P′), Fig. No. 12. And finally at the rear by folding the paper up over the top balsa sheet and cementing it to it. The paper at the ends of the wing is folded up over the top sheet also in like manner. Pull the paper tight from the wing center to the tips as you cement it to the ribs. Put the paper on the second half of the wing in like manner.

You are now ready to make the tail planes. First, cut out the front and rear stabilizer braces, Fig. No. 16 and Fig. No. 17, respectively. These are cut from 1/32″ balsa veneer to the exact size and shape.

Now cut the stabilizer from a piece of balsa 3/64″ thick, 14¼″ long and 4″ wide as shown by (V, X, Y, W) Fig. No. 19. Round off all the corners as shown by arcs on the right hand end. Then draw lines (A-B), (E-C), (A-E) and (B-C). The cut-out sections are first outlined on the balsa sheet with pencil according to the arcs and dimensions given on the drawing. Study this out carefully and draw it accurately. A very good way is to first make a paper pattern, drawing the outline and cut-out portions on the paper and then cutting out the paper to form the pattern. Then make the drawing on the balsa wood sheet from the paper pattern. Both ends of the stabilizer are to be cut out in corresponding manner, though only one side is shown cut out in the drawing.

The rear edge is cut away at the center.

Next the stabilizer braces, Figs. No. 16 and No. 17 are cemented in place to the *under side* of the stabilizer as shown in Fig. No. 19 by (S, S′, T) and (D, D′, P, P′), respectively. When this is done, cement the center braces in place, one to the under side from (D-P) to the front edge of stabilizer and one to the upper side from (C) to the front edge. These are cut from 1/32″ balsa veneer and are ¼″ wide. Cover the cut-out portions with Jap tissue paper, allowing the paper to overlap on the wood about 3/16″. Cement it down smoothly in place.

Now cut out the two fin braces as shown in Figs. (18-A) and (18-B) from balsa veneer 1/16″ thick. The fins are then made from balsa strips 1/16″ thick and ⅛″ wide, according to the dimensions shown in Fig. No. 21. Cement all joints together firmly and allow the frame to dry. The left fin is made with the vertical pieces over the cross pieces and the right one with the cross pieces over the vertical pieces. Now cover these frames with Jap tissue paper, cementing the paper to the side of the frame on which the vertical pieces are *over* the cross pieces.

Trim the edges and cement the fins to the stabilizer in the position shown, Fig. No. 19. Now interlock the fin braces at (X), Fig. No. 20, cementing the joint and cement the upper ends to the fins at (P)

and (P'), just under the cross piece as shown and at the point where the rear vertical strut crosses at (P) Fig. No. 21. Cement the lower ends to the stabilizer at (U) and (U'), Figs. No. 19 and No. 20. Set the unit aside to dry.

THE next job is one of the most difficult and should be done very carefully. This is, cutting the propellers. There are two, one right and one left hand. They are made from balsa blanks 10" long, 3/8" deep and 1 1/4" wide at the widest part (H-M), Fig. No. 22 and No. 22-A. Draw out your blanks to these dimensions according to the pattern, Fig. No. 22.

The right-hand propeller is cut out first as shown in Fig. No. 22-A, the concave faces first by cutting away edge (H), following edges (M) and (N) with your knife so that you finally get a surface between edges (M) and (N). Make this concave, sanding it slightly hollow and smooth with sandpaper. Cut both blades in this manner before the back or convex side of the blades are shaped out. Your propeller will now look like Fig. C.

Now cut down the back of the blade, cutting away edge (K) in Fig. C. Do not make the blade too thin near the hub (about 1/8"). Taper the thickness down progressively from the hub to the tip of the blade, making it very thin at the tip. Cut the backs of both blades in this manner, then cut away the hub at the center as shown in Fig. (E). The dotted portion shows the blade before it has been cut away. Smooth up the propeller when finished. Drill a 1/32" hole at the center (O), and pass a pin through the hole, allowing the propeller to be supported in a horizontal position by the ends of the pin. If one end or blade drops, this one is too heavy and should be sanded down on the convex side until it balances perfectly.

The left propeller is made in a like manner, only it should be cut as shown in Fig. (22-B), following the same procedure as in the case of the right-hand one.

Now put the shafts, Fig. No. 4 into the propeller shaft hole as shown, Fig. No. 23. Pass the straight end through the hole in the hub, with the cut-away portion of the hub toward the hook. Then bend up the end (S) into position (S') and force the bent over end back into the wood of the hub as shown in the drawing. When shafts are in both props, slip a washer (K) over the shaft and hook the shaft hook (H) through the hole in the propeller bearing (B), Figs. No. 8 and No. 1 from the front side, the right-hand propeller through the right-hand bearing and the left propeller through the left bearing, Fig. No. 1.

Now cut two pieces of rubber 22 feet, 8 inches long from 1/8" x 1/32" rubber thread and tie the ends of each piece together so as to form a complete loop. Now loop each piece around four times so as to make four complete loops of all equal length. You will now have your motor 34" long of eight strands or four loops. Hook one into one propeller hook in the front and hook a motor shackle, Fig. No. 2, through the loops of your motor at the rear end and hook the shackle over the motor hook at the rear end of the frame. Put the second motor on the same way. Then close up the propeller hooks and the motor shackle hooks so the rubber loops cannot slip out. At the center of the frame the motors should rest in through curled ends of the center frame brace.

FASTEN the wings in place with light rubber bands as at (E) and (E') Fig. No. 1. The front of the wing should rest on the elevation blocks and should be raised by them to the proper angle of incidence, 3/16". At (M) and (N) the rear edge of the wing can be reinforced by extra strips of balsa cemented to the top of the balsa sheet so the rubber will not cut into the wing at these points, if required.

The stabilizer is fastened to the top of the frame by a rubber band (S), (S'), passing over the stabilizer, under the fin braces and looping around the rear end of the frame as at the front of the stabilizer.

Before flying your plane, oil the propeller shafts and be sure that the wing is set on frame so that its CENTER comes over the center of gravity.

Move the main wing back if the machine stalls, about 1/4" at a time and forward if it will not rise.

You can safely put nine hundred (900) turns on each motor at first and after a few flights, 1100 turns or more. This is, of course, only when a winder is used.

If further information is desired write to UNIVERSAL MODEL AIRPLANE NEWS.

Let the Glide Improve Your Flights

(Continued from page 17)

will allow thermal up-drafts to operate, keeping the plane in flight indefinitely.

Several such devices have been used on models but some are difficult to make or are unreliable. Here is one that is practical.

THE principle of this device is extremely simple. During the flight, the power of the motor is transmitted by the prop-shaft, to the propeller, but after the motor stops, and the shaft stops revolving, all connection between the motor and propeller is broken. Then the propeller revolves freely, the shaft and rubber remaining motionless. The entire construction consists of a simple shaft which engages a small protruding metal piece on the propeller and thereby turns the propeller. This little metal catch can turn easily in only one direction. In the other, it is stopped by a pin. When the motor stops, the propeller begins another revolution and the catch turns away from the spur on the shaft until it comes around, now on the other side of the spur, again. The force of the revolution causes the spur to turn the catch inward so it no longer obstructs the movement of the propeller.

Since the propeller revolves on the shaft, a thin sheet of aluminum or duralumin is placed over each hub face (N.B., the little catch is of the same metal), to keep the prop running. The washer raises the first bend in the shaft so that it passes over the head of the pin.

Now, following the plans, begin the construction of this simple device and you will find that you will obtain excellent results with a few minutes' work.

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Digest of Rules—

National Championship Model Airplane Meet

(Continued from page 25)

approximate streamline form and have not less than 90 per cent of its surface area covered. Outriggers and booms may be used. The fuselage shall be a structure which supports the motor, wings, empennage and landing gear. If rubber is used for motive power, it shall be contained entirely within the fuselage.

STICK MODEL—A model airplane of the stick type has a body composed of a single stick or open framework, rather than a fuselage. Models using tubes to enclose the motors, and those not meeting the fuselage requirements, are classed as stick models.

DESIGNS OF MODELS—There are no restrictions on the design of the models except that they must meet the specifications set forth in the definitions and classifications.

NUMBER OF FLIGHTS—Each contestant will be allowed a total of three official flights. A flight is a start that lasts 10 seconds or longer in an outdoor contest, and 30 seconds or longer in an indoor contest. A flight less than that or failure to fly promptly when called shall be judged a delayed flight. Three successive delayed flights shall be considered as displacing one official flight. A contestant may, at his option, declare a delayed flight when his model meets an obstruction that prevents further flight. This declaration must be made to the timers immediately upon occurrence of the collision, otherwise the flight is official. However, should subsequent official flights fail to surpass the duration of a flight that has been declared as delayed, the contestant will be granted the reinstatement of his delayed flight as official.

TIME OF FLIGHT—Flight time starts the instant a model is in flight and ends when the model first touches the ground or floor after being launched, or meets an obstruction that prevents further flight. Time also ends when the model passes from the sight of the timers, but the timers shall make every effort to keep the model in sight until it lands. If a model meets an obstruction and falls free independently and resumes flight within ten seconds, time shall continue. However, if an obstructed model is freed within one minute by any means, time will be resumed and counted from the instant when obstructed.

NOTES

There is no limitation to the length of fuselage, motor stick, rubber motor, or number of motors. Gears, chain-drive, belts, multiple motors, and any number of propellers may be used. Models may be either tractors, pushers or a combination of the two. As long as models are within the specifications of the rules and definitions, they are eligible. Wings may be either single or double surfaced. The "one ounce to each 50 square inch of area" rule applies only to the Mulvihill Outdoor and Stout Outdoor contests. Any type of power except rockets is optional.

Air Ways—Here and There

(Continued from page 39)

Ruth Parmalee, Norvan Strohmeyer and Mac Closer. It is very gratifying to note that the so-called weaker sex is entering the model airplane field so successfully.

Bamberger Aero Club

This month we have news from the very active Bamberger Aero Club. An indoor model meet was recently held on the 1st of April at the 113th Infantry Armory, Newark, N. J.

John Romanowski of 205 Railroad Avenue, Jersey City, N. J., set a new indoor glider record of 28 2/5 seconds.

Models made of balsa wood, one-sixteenth of an inch thick, covered with the finest of Japanese tissues and powered with rubber bands, were launched by boys from many towns in New York and New Jersey, as judges, with split-second stop watches, clocked them.

A new New Jersey record in the R.O.G. scale model event of 4 minutes, 51 1/5 seconds was made by Emanuel Radoff, 535 South 16th Street, Newark, N. J. Alton

Summary

Advanced Class:—GLIDER EVENT:
John S. Romanowski, 205 Railroad Ave., Jersey City, N. J., 28 2/5 sec.
August Ruggeri, 23 East 3rd Street, New York City, 24 sec.
R.O.G.:
Emanuel Radoff, 535 South 16th St., Newark, N. J., 4 min., 51 1/5 sec.
Alton Du Flon, 561 Prospect Ave., Ridgefield, N. J., 4 min., 44 sec.
TRACTOR EVENT:
Alan Brown, Madison, N. J., 6 min., 59 sec.
Henry Orzechowski, Newark, N. J., 5 min., 35 sec.
COMMERCIAL EVENT:
Alton Du Flon, 561 Prospect Ave., Ridgefield, N. J., 4 min., 59 sec.
Martin Faynor, 66 Congress St., Newark, N. J., 3 min., 49 2/5 sec.
Novice Class:—GLIDER EVENT:
D. Hecht, 273 East 176th St., Bronx, N. Y., 20 sec.
L. Bansemer, 394 Chestnut St., Nutley, N. J., 10 2/5 sec.
R.O.G.:
H. Devlin, 417 Walnut St., Elizabeth, N. J., 3 min., 10 2/5 sec.
A. Ferreira, 45 Congress St., Newark, N. J., 3 min., 7 sec.
TRACTOR EVENT:
S. Avina, 85 Halstead St., Newark, N. J., 4 min., 7 sec.
D. Herman, 219 Elmwood Ave., East Orange, N. J., 1 min., 37 sec.
COMMERCIAL EVENT:
R. Steinbacher, 1126 Edgewater Ave., Ridgefield, N. J., 2 min., 24 sec.
F. Gerstenmeier, 493 Springfield Ave., Newark, N. J., 1 min., 13 sec.

Lakewood Model Speed Foundation

WE have some interesting news from Bill Becker of 1657 Wyandotte Avenue, Lakewood, Ohio. He says: "There has been a movement started in Lakewood which is called the Lakewood Model Speed Foundation." (Some of the members are shown in picture No. 23.) "The main idea of this organization is to develop speed

models. Contests are held once a month and the results have been surprising. There are many strict rules which every contestant must follow. These contests or races are held like the big races. The planes are licensed and numbered like the real planes. For the most part, the models were designed by the builders. The planes are flown and timed over a fifty-foot course and the four best consecutive flights are averaged for the official time. The first contest was interesting but fatal, because nearly every contestant went home with pieces instead of planes. The winning speed was 30.74 m.p.h. In the second contest, the boys learned how to prevent breakage and build stronger ships. The winning speed was 31.41 m.p.h. To prevent more accidents in the third contest, we restricted the method of launching to take-offs. We thought the speed would be decreased but it jumped up, the winning speed being 32.47 m.p.h. In the fourth contest the speeds skyrocketed to unbelievable limits. The winning speed was 44.30 m.p.h. Second place was 42.77 m.p.h. We have even edited a small paper to create interest. In the first contest we had 8 entrants and now this has swelled to over 30. I have been a steady performer in this competition."

Becker placed 2nd, 1st, 4th and 2nd in the first four contests.

This organization should develop some very interesting ships. However, I would like to go on record in these columns as saying that I think that the distance of the speed course should be 300 feet. Whenever it is possible, I believe the use of a short speed course should be discouraged. Actually when a model is flown for only 50 feet, it is not an accurate or real test of the model's speed for two reasons. First, there is always a certain amount of inaccuracy in timing speed events. This inaccuracy may only be 1/5th or 1/10th of a second. Those who time speed events realize that the accuracy of timing depends upon accurately registering the start of the flight by the pressure of a finger on the stop watch. Some people react slower than others. The duration of the actual flight is of such a short period that even a 1/10th of a second inaccuracy is a large proportion of the actual flying time. Another very good reason for discouraging this system of speed racing is that, with a short speed course, the boy who could put on the greatest number of rubber bands, provided he has a reasonably well-constructed plane, will win. In other words, with a short course, it is merely a matter of how much rubber can be put on the machine, not a matter of clever aerodynamic design. When the speed course is lengthened to 300 feet, speed cannot be gained over this distance by merely adding rubber, for if a large amount of rubber is put on, the model will not fly the distance of the whole course, for enough turns cannot be put on the rubber to have the propellers turn over for a sufficient length of time. Therefore, it becomes a matter of efficient streamlining, wing design, propeller efficiency and good balance. All these qualities should be promoted in young model designers.

Islip Model Airplane Meet

That the young model airplane builders of today are the pilots, designers and manufacturers of tomorrow, was an opinion expressed by one of the foremost men in aviation. This statement was recalled forcibly to mind at the fifth annual Model Airplane Meet at the Islip Airport, Long Island, which was sponsored by the Islip Chamber of Commerce. Among the judges was a person of note, Mr. Charles L. Lawrence, designer of the Wright Whirlwind motor.

Sustained flight; Class one:—Twin Pusher or Tractor Models, 40-inch fuselage or under. This class was open to all, with no age limit. Each entry permitted two trials; won by Joseph Vanacek, of East Islip. This model, a tractor, flew eight minutes when it became lost to sight. Class two; Tractor Models, any size, won by Claire Kube, of Islip, flew 24 minutes. Class three; Fuselage Models, any size, won by Claire Kube, 2 minutes, 46 3/5 seconds. Class four; Flying Scale Models, any size, won by Claire Kube, 25 seconds.

CLAIRE KUBE, a senior at the Islip School, carried off most of the honors of the day. His tractor model was officially clocked at 24 minutes. Although only credited with 24 minutes, it flew to a height of about 2000 feet and became lost to sight of those at the field. However, 55 minutes after the take-off, it was sighted over Bay Shore and going steadily outward over Great South Bay, five miles from the airport. The official record for sustained flight at that time was 41 minutes.

Classes five and six were non-flying scale models divided into two classes, both of which were won by Claire Kube. The winning plane was a Boeing Pursuit P12B.

Picture No. 24 shows Claire Kube, of Islip High School, who carried off most of the honors. Picture No. 25 shows a group of the prize-winners with their trophies.

Connecticut Model Airplane Association

THIS organization has recently completed its first year of existence and Julius Safanski of Hartford was named president at the annual meeting held in the Junior Achievement Rooms in City Hall, March 11th. Readers of the magazine will probably remember that the old president, Herbert Owen of New Britain, Conn., established a world's record for Baby R.O.G.s in the model airplane meet in December, which was sponsored by UNIVERSAL MODEL AIRPLANE NEWS.

The new officers were named as follows: Julius Safanski of Hartford, president; Warren Coe of New Britain, vice-president; Blair Watson of Hartford, secretary; John Gunther of Meriden, treasurer.

(Continued on page 48)

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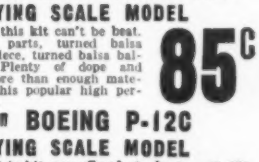

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JAPANESE Model Airplane Tissue, 32 colors, also Wood Veneer. Send for samples. See our ad. this paper with Jap. Girl's face. Whitfield Paper Works, Importers, 12 Vestry Street, New York City.

AVIATION—EQUIPMENT—CATALOGS

USED Airplanes $50 and up. Sensational Bargains. Literature 10c. Federal Equipment Co., Dept. 10, Deerpark, Ohio.

BROTHER, Can You Spare a Dime? If you can, send it to me and I'll send you my 1933 Low Priced Aviation Material Catalogue. Karl Ort, 684 W. Poplar St., York, Pa.

DEALER LIST STILL OPEN

UNIVERSAL MODEL AIRPLANE NEWS intended to make no more additions to its list of Model Airplane Dealers after May 1st. However, names of dealers who wish to be on this list and receive, by first class mail, the latest commercial news of the model industry, have continued to pour in on our Dealer Department so fast that the list is being kept open until June 1st.

As you read this notice, Bulletin Number One is being sent out to dealers whose names we now have. Extra copies of the bulletin, which tells about two fast-selling, trade-building items which, if unsold, can be returned by the dealer at full purchase price, are still available.

A beautiful 18" flying model of the famous Bellanca Skyrocket. No visible bulkheads (see photo). Kit contains ready-cut ribs, full-size blueprint, newly developed balsa color, cell, drag ring and wheels, etc.

SPECIAL (This Month Only) 80c (plus postage)

Carved Balsa Props
(Specify high or low pitch)
5" one-piece 5c
6" one-piece 6c
7" one-piece 8c
8" one-piece 10c
9" one-piece 12c
10" two-piece 13c
11" two-piece 14c
12" two-piece 15c

Turned Balsa Wheels
¾" (balloon) .... 4c pr.
1" (balloon) .... 5c pr.
1¾" (balloon) .... 6c pr.
1¼" (with bushing) 6c pr.

Colorless Cement
Large tube 10c

Japanese Tissue
Hakone (colored) 2 for 5c
Extra Thin (silk) .. 6c ea.

No order under 25c. Add 15c for packing and postage on orders under $1.00. Orders over $1.00 add 10%. No stamps, C.O.D.s or foreign coins accepted.

Send 3c stamp for complete price list

Art Kronkelt's Model Supply
215 Mountain Ave. Arlington, Mass.

Air Ways—Here and There

(Continued from page 47)

— IMPORTANT NOTICE —

On the 27th of May, 1933, the Connecticut Model Airplane Association will hold its annual indoor model meet at Hartford, Conn., in the State Armory. All those who live in the vicinity and who wish to compete should report to J. Blair Watson, secretary, 228 Putnam Street, Hartford, Conn.

Westchester County Meet

THE Westchester County Miniature Aircraft League held its indoor tournament on March 11th at the Westchester County Center, White Plains, New York. The meet was attended, as usual, by a large number of contestants from all over the county. Eighty-seven boys participated, representing 12 clubs. Eight clubs won places.

The winners of the first three places in each event were:

Glider Duration, Senior:
Francis Schaider, White Plains, N. Y. — 12.2 sec.
Norton Reed, White Plains, N. Y. — 10.8 sec.
Robert Yellett, Peekskill, N. Y. — 7.0 sec.

Glider Distance, Senior:
Arthur Wetherbee, White Plains, N. Y. — 85 min. 10 sec.
Edward Cotter, New Rochelle, N. Y. — 83 min. 4 sec.
Robert Yellett, Peekskill, N. Y. — 73 min. 11 sec.

Baby R.O.G., Senior:
Francis Schaider, White Plains, N. Y. — 4 min. 21.8 sec.
Paul Kartluke, White Plains, N. Y. — 2 min. 59 sec.
Thomas Allen, White Plains, N. Y. — 2 min. 55.8 sec.

Endurance Stick Model-H.L., Senior:
Francis Schaider, White Plains, N. Y. — 8 min. 37½ sec.
Paul Kartluke, White Plains, N. Y. — 4 min. 47 sec.
Ford Ferris, White Plains, N. Y. — 4 min. 45 sec.

Stick Model-H.L., Novice:
Paul Kartluke, White Plains, N. Y. — 3 min. 55 2/5 sec.
Theodore Sastion, White Plains, N. Y. — 2 min. 29 1/5 sec.
James Pettit, Peekskill, N. Y. — 2 min. 12 sec.

Senior Fuselage, H.L.:
John Van Orden, Peekskill, N. Y. — 10 min.
Charles Carter, Bizzards — 9 min.

Junior Fuselage, H.L.:
Arthur Witherbee, White Plains, N. Y. — 11 min. 4 sec.
Jack Fields, Ossining, N. Y. — 4 min. 2 sec.
Paul O'Meara, Tarrytown, N. Y. — 4 min. 2 sec.

Auburn Post Model Airplane Club Contest

A contest in model airplane construction was held March 18 by the Auburn Post Model Airplane Club in Cranston, R. I. The results of the contest, based upon workmanship, were as follows. There were three events.

Scale Model Event:
Kenneth Ford, Stinson Tri-motor.
Charles Reynolds, Curtiss Hawk P6-E.
Dana Farrar, Gee-Bee Sportster.

Flying Event:
Foster Rounds.
Kenneth Willard.
Willard Grogan.

Glider Event:
Foster Rounds.
2nd place tied, William Grogan, Lawson Mitchell.

The scale model event was the most popular. In addition to the winners, there were entered the following types of models: Two Curtiss Condor Bombers, two Gee-Bee Sportsters, a Boeing P-26, two semi-scale biplanes.

THE club was founded last summer as the Forest Hills Model Airplane Club, but is now sponsored by the Auburn Post 20, American Legion. It meets every Saturday morning in the American Legion building on Legion Way, Cranston, R. I.

CORRESPONDENTS

The following readers of UNIVERSAL MODEL AIRPLANE NEWS would like to hear from all those interested in model aviation:

William T. Howell, Jr., 1718 Parker Ave., Detroit, Mich.

John Chaley, Jr., 63 East 177th St., Bronx, New York. (This young man would like to have model airplane builders write to him who would like to organize a model club in the Bronx.)

Here we have a Mr. Victorio Naguera of 1045 Montevidio St., Buenos Aires, Argentina, who writes in and would like to have model builders in the United States correspond with him and tell him something regarding activities here in the States.

Neil Armstrong of Alvinston, Ontario, Canada, would like to join an airplane club. Will not someone in that neighborhood get in touch with him and help him out?

Here is someone else to correspond with. Gordon Davidson of "The Nook," 41 Roslyn Street, Ashbury, Sydney, Australia, would like a correspondent in the United States.

George Kinsman of 28 Russell Street, Hammond, Indiana, would like to trade an issue of UNIVERSAL MODEL AIRPLANE NEWS for some model airplane supplies (bamboo, glue).

Frank Zerilli of 158 Wilson Avenue, Brooklyn, New York, secretary of the Wilson Aviation Club, would like to expand his club and requests that those who would like to join get in touch with him immediately. He says they are offering a free United States Army Cadet Ground Course.

Mr. Edward H. Farrell, D.D.S., of 80 Duke Street, Port-of-Spain, Trinidad, would like to have model builders correspond with him. Mr. Farrell is one of the few active model builders in Trinidad.

Notice: We have been asked to print the following notice by Louis Laerman of 1551 80th Street, Brooklyn, New York:

"I flew the plane from the baseball field in Dyker Park, which was situated near 86th Street and 14th Avenue. It flew towards First Avenue. After five minutes we lost sight of the plane. It had a 26-inch wing, chord of 4 inches, and a body length of 22 inches."

Will the finder of the ship above mentioned be so kind as to return it to Laerman?

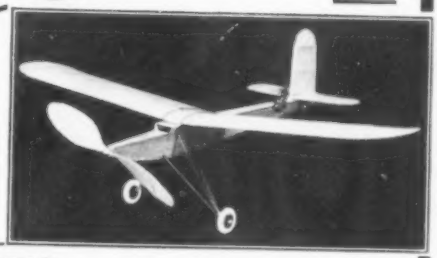
GIVEN FREE

A Beautiful
GLIDER KIT

Everything to Complete a Real Model Glider, with a purchase of $1 or more.

LAST CALL

Greatest Kit Value Ever



Again we repeat these fine big kits at HALF THE REGULAR SELLING PRICE. *This is merely a plan to double our present business and, to do so, we say "all our kits must go." It's our way of "treating you to the best airplane models in America at a fraction of their original selling prices." Send away at once, take advantage of this offer*—THE MOST SENSATIONAL EVER!

3-in-1 Kit

Three R.O.G. Stick Models **75c**

Outdoor Twin Pusher

A twin pusher that has actually flown 12 minutes, not once but several times. This plane has several features which cannot be found elsewhere. It has a 40-inch "A" frame that is a marvel for lightness and strength; a 36-inch high cambered, tapered wing, and two 12-inch, high pitch props, powered by 68 feet of ¼ flat rubber. The kit contains complete plans and instructions, stamped ribs, and all other materials needed for the construction of the model. Price .....

75c

Add 10c for Postage

2-in-1 Kit

Contains the around-the-world "Winnie Mae" and the "Transatlantic Bellanca." Both 15" wing-span. Kit contains full-size plans, bulkheads, large tube of cement and all other materials needed to complete these two wonderful models. Get yours now.

75¢

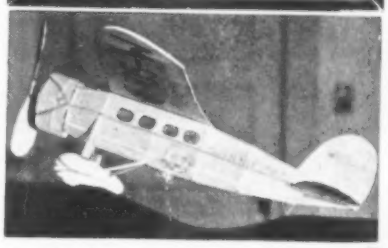
Add 10c for Postage

Outdoor Cabin Tractor

One of the snappiest flying models in its class, proper engineering and all balsa construction does it. This plane has a double surfaced, high lift wing, 30 inch span, all-balsa fuselage, extra strong landing gear to withstand the shocks of outdoor flying, and a large, wide bladed propeller to keep it up for long endurance flights. The Kit contains complete plans and instructions, stamped ribs, large tube cement, 1 oz. bottle clear dope, pair celluloid wheels, and all materials needed to complete the model. Price .....

75c

Add 10c for Postage



ORDER NOW

READ BEFORE ORDERING:
In Order for Prompt Delivery Please Comply with Instructions Below.

1. Orders under 25c not accepted due to our very low prices. 2. Add 10c for packing and postage on orders up to $1.50; on orders for $1.51 and over add 10c for packing and postage charges. 3. Add 10c extra to above charges on Balsa plank orders less than $1.50 west of the Mississippi and Canada. 4. Postage stamps, Canadian or Foreign Coin not accepted as payment. 5. Remit by check, postal or express money order. Make payment to MADISON MODEL AIRPLANES, Inc., 134 Livingston Street, Brooklyn, N.Y. 6. Add for forte insurance against breakage in transit.

Canadian Charges—Add 25c for packing and postage on orders up to $1.50. On orders of $1.50 and over add 15% packing and postage. Postage stamps, Canadian or foreign coin not accepted as payment.

Dealers and Clubs Write for Special Price List.

Insignia

U. S. Army and Navy type, sheet

1" diam. ..... .02
1½" diam. ..... .03
2" diam. ..... .04
2½" diam. ..... .05

Sandpaper

Large Sheet 5c

BUY DIRECT

NOTE

All Balsa shown here in 18" lengths can also be had in 36" lengths, if requested.

Balsa Wood

This balsa is clear, straight grained stock. It is strong, light, and free from defects. If hard or soft wood is desired, specify when ordering.

18" Lengths

1/16 x 1/16	20 for	.05
1/16 x 1/8	24 for	.05
1/16 x 1/4	24 for	.07
1/8 x 1/8	24 for	.05
1/8 x 3/16	24 for	.09
1/8 x 1/4	24 for	.12
3/16 x 3/16	16 for	.06
3/16 x 1/4	16 for	.07
1/4 x 1/4	16 for	.08
1/4 x 3/8	6 for	.08
3/8 x 3/8	6 for	.09
3/8 x 1/2	6 for	.09
1/2 x 1/2	4 for	.10
1 x 1	2 for	.16

40" Lengths

1/8 x 3/8	.03
1/8 x 1/2	.03
3/16 x 3/8	.03
3/16 x 1/2	.04

Sheets—18" Lengths

1/32 x 2	4 for	.07
1/16 x 2	4 for	.06
1/8 x 2	4 for	.09
3/16 x 2	2 for	.08
1/4 x 2	2 for	.09

Plank Balsa

1 x 3 x 36	.25
1 x 6 x 36	.38
2 x 3 x 36	.42
2 x 6 x 36	.75
2 x 5 x 10	.75

Propeller Blocks

½	x ⅝	x 5	8 for	.06
½	x ⅝	x 6	8 for	.07
⅝	x 1	x 7	8 for	.09
⅝	x 1	x 8	4 for	.06
¾	x 1¼	x 8	4 for	.08
¾	x 1¼	x 10	4 for	.09
¾	x 1½	x 11	2 for	.07
⅞	x 1½	x 11	2 for	.08
⅞	x 1½	x 12	2 for	.07
⅞	x 1½	x 12	2 for	.09
⅞	x 1½	x 14	2 for	.16

Dowels

Straight grained, true size birch dowels — highest quality grade.

1/8 x 18" long	7 for	.05
3/16 x 36" long	6 for	.05
1/4 x 36" long	4 for	.05

For a limited time 12" lengths ..... 12 for .05

Bamboo

Genuine, straight grained, jacket TONKIN Bamboo. Strong and light. Splits easily. Doz.

1/16 x 1/4 x 12"		.07
1/32 x 1/4 x 8"		.04
1/16 x 1/16 x 9"		.05

Japanese Tissue

A fine tissue for covering flying scale models. Strong, light, and takes dope well.

20 x 24 ..... 5 for .05

Veri-Fine Tissue

One of the lightest tissues known. Excellent for endurance models, because of its extremely light weight.

20 x 15 ..... .04

Colored Tissue

Just the thing for the new bright colored ships that are so popular nowadays. Red, Orange, Brown, Blue

20 x 24 ..... 2 for .05

Wood Veneer Paper

Very useful in scale and flying scale models. Strong yet light enough to fly.

20 x 30 ..... .13

Celluloid Wheels

Experience has proven these wheels best for flying scale models. Pair

1 7/8"	wheels	.05
1"	wheels	.07
1 3/8"	wheels	.09
1 7/8"	wheels	.13

Bushings

for wheels ..... 4 for .02

Music Wire

Strong, springy wire sold in this new, convenient manner.

1 ft. lengths—straight .011, .020, .028, .034

6 feet for .02

Dummy Motors

The very thing for adding that realistic touch to scale and flying scale models. Extremely light. Nine cylinders.

1 1/2" diam.	.16
2" diam.	.28

Rubber Thread

Careful testing has proven this rubber to be the highest in energy content per unit of weight. This means more turns and less breakage.

.045" sq	50 ft. for .12
3/32 flat	50 ft. for .13
1/8 flat	50 ft. for .13
3/16 flat	50 ft. for .16

ALUMINUM ITEMS

Drag Rings

Used on the real ships for cutting down wind resistance. Makes a beautiful addition to any radial motored model.

1 1/2" diam.	.15
2" diam.	.17
2 1/2" diam.	.22
3" diam.	.25

N.A.C.A. Cowlings

No dummy motor needed when this cowling is used. Has a hole for thrust bearing in the nose.

1 1/2" diam.	.15
2" diam.	.17
2 1/4" diam.	.23
3" diam.	.26

Aluminum Tubing

.016 wall thickness	ft.
1/8 O.D.	.05
3/16 O.D.	.06
1/4 O.D.	.11

Aluminum Leaf

Real sheet aluminum, yet almost as light as paper. Makes a beautiful covering job.

.0003 thick

3 1/2" wide ... 5 ft. for .05

Sheet Aluminum

12" wide

.003, 12c ft.; .005, 12c ft.

.010, 16c ft.

Washers

For indoor, outdoor, and flying scale models.

Large size, 1/4 O.D.

Dozen, 1½c; Per 100, 10c

Small size, 1/8 O.D.

Dozen, 1½c; Per 100, 15c

Clear Cement

The fastest drying, lightest and strongest cement on the market. Try some now. You'll be amazed at its marvelous properties.

1 oz. tubes	.06
2 oz. tubes	.08
4 oz. cans	.20
1 pt. cans	.60
1 gal.	4.50

Clear Dope

Just suited for the model user's requirements.

2 oz. cans	.07
4 oz. cans	.13
1 pt. cans	.37
1 gal.	2.50

Acetone

For thinning out heavier liquids.

2 oz. cans	.07
4 oz. cans	.13
1 pt. cans	.37
1 gal.	2.50

Colored Dope

Highest quality pigmented dope. Do not confuse with inferior grades. Leaves a smooth, even color upon drying.

Blue, Red, Yellow, Orange, Silver, Black, Olive Drab

2 oz. cans	.09
4 oz. cans	.15
1 pt. cans	.60

Thrust Bearings

Light, strong bearings. Hole is truly centered.

Large size .035 hole

Each, .01½; Dozen, .15

Small size .025 hole

Each, .01½; Dozen, .15

You Just Can't Beat Madison Values

Look Over These Prices

MADISON MODEL AIRPLANES, Inc., 134 Livingston St., Brooklyn, N. Y.

Our Kits and Supplies Are Handled by Leading Department Stores—ASK FOR THEM

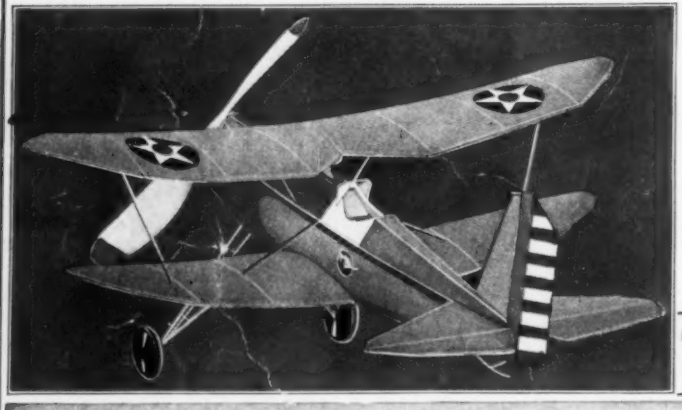
A NEW Idea! Build, FLY Comet's ARMY-NAVY SQUADRON! ALL 3 Planes $1.65

Build this colorful, 3-ship Comet Squadron of fierce Army and Navy fighters! Boy, what fun you'll have! And you can get them SPECIAL at $1.65 (Present coupon to Dealer to get Special $1.65 price, or order direct.) Now you can build and FLY the Capt. Page Navy Racer, Curtiss Hawk and C-1-Pursuit. What flyers! Hurry! Be FIRST in your neighborhood. Buy at Dealer's, or order direct if you have no Comet Dealer! NOW!

50c

NEW Army Fighter — CURTISS HAWK — Flying Scale!

At last it's ready—this Comet Crafted Curtiss Hawk Flying Scale that sells for only 50c! Easily built—as all Comet planes! This is the ship most widely used in the U. S. Army. Get yours right away—and get it in the "ARMY-NAVY" SQUADRON at Special Price! Don't delay an instant—COMPLETE KIT includes die-cut parts, disc wheels, bamboo, print, balsa sheet—all balsa parts needed, all wire parts, banana oil, cement, Jap tissue. Full-size 3-View plan, instructions, etc. Beautiful—and a flying fool! Hurry now.



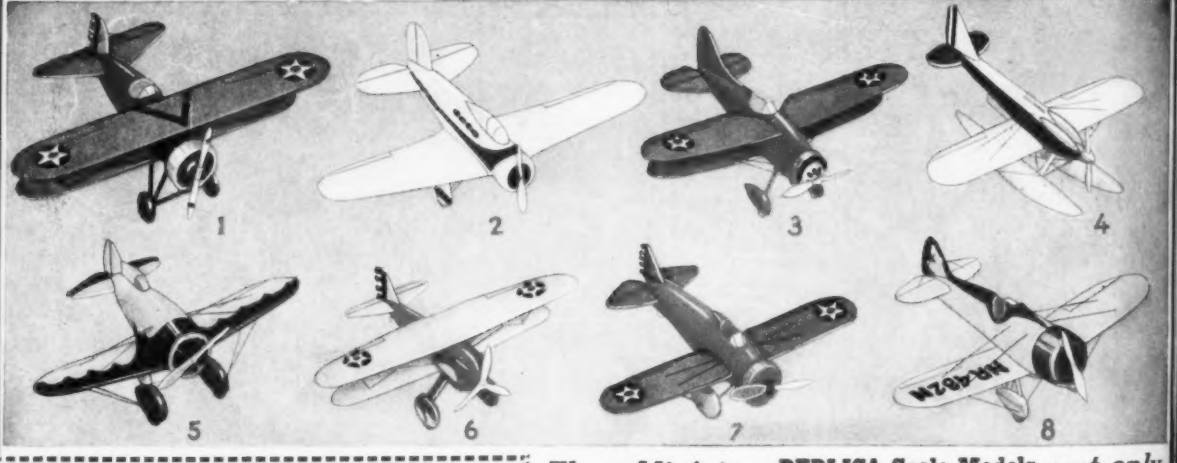
JUST OUT! *Flying Scale* Capt. PAGE NAVY RACER 50¢

An amazing FLYING Scale with interchangeable wheels, pants or pontoons! Comet-Crafted to FLY its heart out! Only 50c at dealer's or prepaid! What a beauty! Get yours quick . . . save money getting it in "ARMY-NAVY" SQUADRON at Special price! COMPLETE KIT has: Die-cut pants, all wire parts, rubber, printed rib sheet, all balsa parts needed, banana oil, cement, Jap tissue, full-size 3-view plans, celluloid, bamboo, dowel rod—EVERYTHING COMPLETE as in ALL COMET KITS. HURRY—get yours quick! Sensational flyer!—and a FLYING SCALE!

"C-I-ARMY PURSUIT FLEW 1300

75c

feet!" And C. Kowalka (O.) also says: "Easiest ship I ever built, plans so easy to follow!" Looks like real Army biplane. Takes off, winds thru skies, makes perfect 3-point. 17" x 12¾" x 4". Thousands built, flown. Hurry. COMPLETE Kit, only 75c. Save money—buy it in "ARMY-NAVY" SQUADRON!



COMET

CATALOG: 5c with order, 10c without order. Brightly colored, supplies, kits. Greatest out!

COMET DEALERS: Accept this coupon from customers for Special $1.65 offer. Send coupon to us for 10c credit. (A 25c credit allowed on Replica Special of $1 when coupon is sent us.)

NEW DEALERS WANTED! Write for "Sales Guaranteed" Plan. **Make big money!**

COMET Model Airplane & Supply Co.,
Dept. M-53, 3114 Harrison, Chicago, U.S.A.

C.O.D. ☐ Send articles checked. I'll pay postman for articles, C.O.D. fee, postage, **on delivery!**

CASH ☐ I enclose $_____ for articles checked. Comet pays postage.

CHECK GROUPS OR ARTICLES WANTED

[ ] ARMY-NAVY SQUADRON. **Individual** Flying Planes: [ ] Capt. Page Navy Racer, [ ] Curtiss Hawk, [ ] C-1-Army Pursuit. CATALOG 5c with order, 10c without. **Replica Models:** 1[ ], 2[ ], 3[ ], 4[ ], 5[ ], 6[ ], 7[ ], 8[ ], 9[ ], 10[ ], 11[ ], 12[ ].

NAME_____

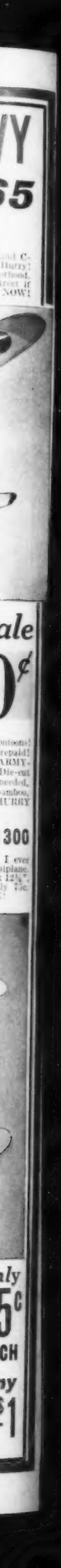
STREET_____

CITY_____ STATE_____

These Miniature REPLICA Scale Models *cost only* 25c EACH

We pay postage on orders for 2 or more (order less than 2—send 5c for postage). Big fun carving these non-flying, exact replica models. Great for decorating room! SPECIAL . . . ANY 5 for $1 prepaid or at Dealer's. (must present coupon to get Special $1 price at Dealer's.) **Order by Number:** 1. Boeing Fighter. 2. Lockheed Orion. 3. Akron Fighter. 4. Supermarine S-6. 5. Gee-Bee Supersportster. 6. Curtiss Hawk. 7. Boeing Low-Wing Attack. 8. Shell Mystery Ship (last 4 models not shown here). 9. Howard's Ike. 10. Capt. Page Navy Racer. 11. Polish Fighter. 12. Vought Corsair. EACH KIT COMPLETE: instructions, materials, etc. Add 5c postage if you order only 1 kit by mail.

Any 5 $1

SEND NO MONEY! JUST MAIL COUPON!

Remember, we Guarantee 100% Satisfaction or exchange, or money back. Now is so convenient. C.O.D. way—mark, mail coupon, pay for articles, C.O.D. fee, postage, **on delivery!** We pay postage on **cash** orders. (Add 5c if ordering only 1 Replica model.) Send cash by money order or reg. mail always. West of Mississippi, add 10c more. **CANADIANS:** No C.O.D., stamps, nor coin. International Money Order only, plus 20% extra. Hurry—order now **at your dealer's** or RUSH COUPON!